NEW ZEALAND JOURNAL OF Agriculture

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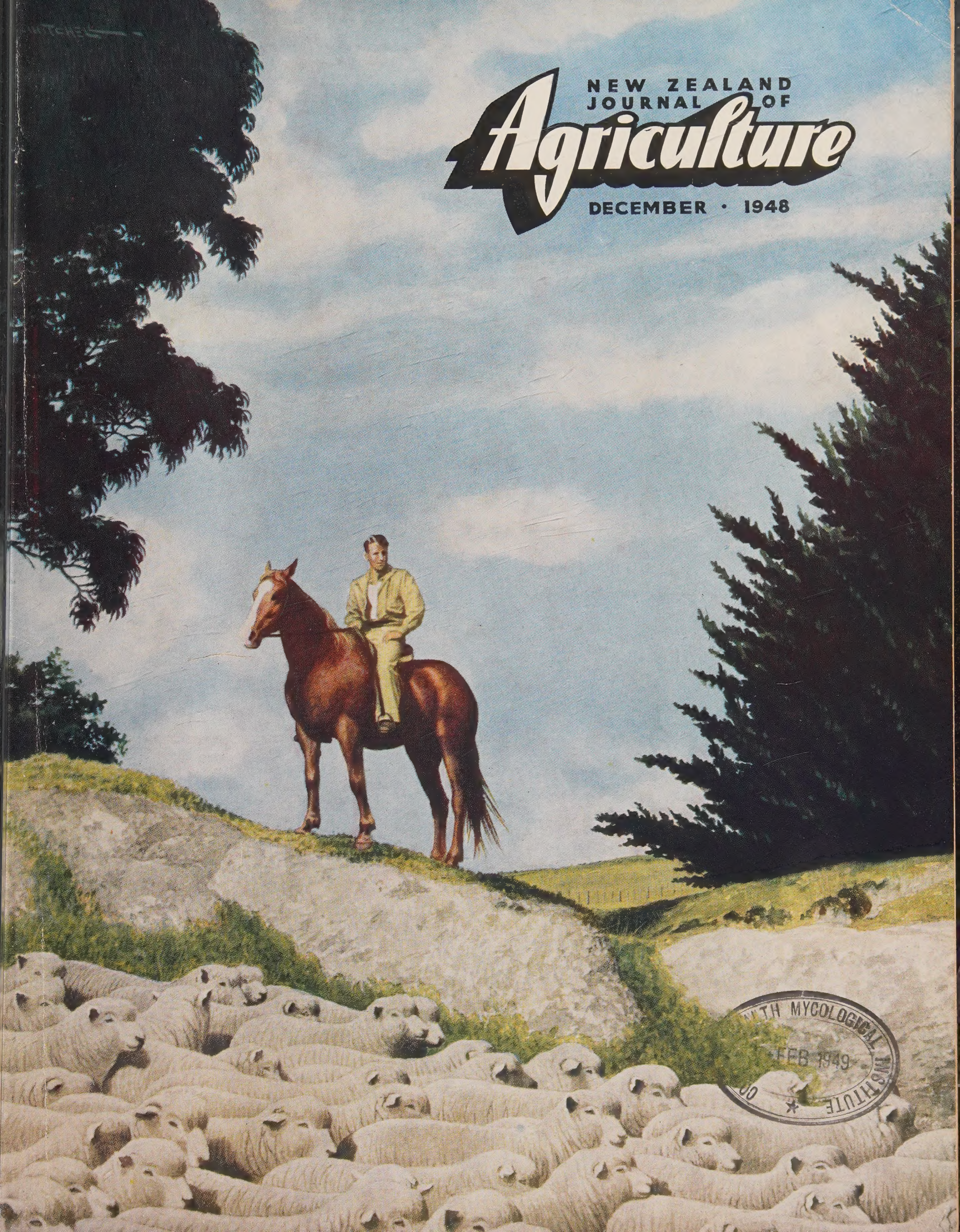

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NEW ZEALAND JOURNAL OF Agriculture

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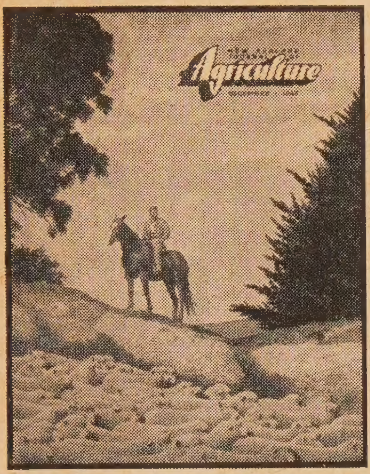
This month's cover



Since sheep were established permanently in New Zealand a little more than 100 years ago the expansion of the sheep industry has been immense, and today both wool and meat are among the major items of the Dominion's exports. The high lambing rate, which in recent years has averaged about 90 per cent., and the reduction in mortality effected by better methods of flock management generally have ensured a steady increase in numbers of sheep, the Dominion total now being more than 32,000,000. This month's cover, showing a mustering scene on a farm in the Tirau district, Auckland, has been painted by L. C. Mitchell and is based on a photograph taken by Neuline Film Studios Ltd.

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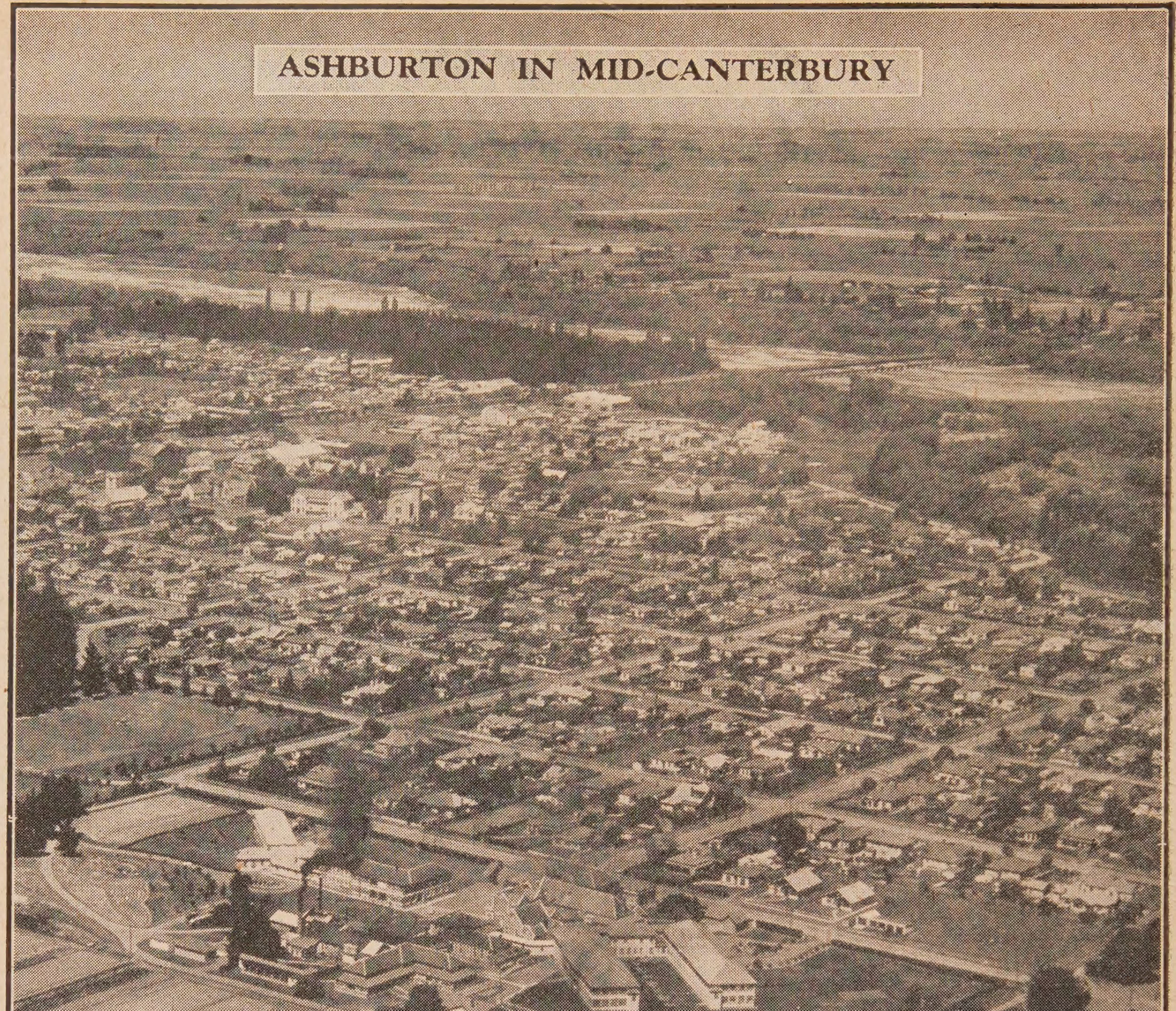
ASHBURTON IN MID-CANTERBURY



Principal town of Mid-Canterbury, Ashburton is the centre of a rich agricultural district of which the soil and climate are eminently suited to the production of grain. The largest quantities of wheat and oats in New Zealand are produced in Ashburton County and considerable areas are devoted to the growing of barley, peas, linseed, potatoes, and small seeds. In addition, about 1,000,000 sheep are carried for wool and fat lamb production.

[*V. C. Browne photo.*

WHEAT PRODUCTION : A LONG - TERM POLICY

TO be self-supporting New Zealand would require to grow at least 350,000 acres of wheat. It is realised, however, that this figure cannot be reached under our present farming economy, but it is most desirable that we should make an all-out effort to grow at least 250,000 acres during the 1949-50 season.

The world bread grain situation for 1948-49 has been reviewed by the Food and Agriculture Organization and its published statement stresses the following features: 1. A total world production about 5 per cent. above that of last year and about equal to the pre-war average; 2. A European harvest some 40 per cent. more than in 1947, although still less than pre-war; 3. A large wheat crop outlook in the four chief exporting countries (United States, Canada, Australia, and Argentina) taken together, although less than the phenomenal figures of last year; 4. Continued high import requirements associated with the desire of deficit countries to relax grain controls and to increase stocks; 5. The continuing large share of the United States in total world exports.

The Organization, in noting the general tendency of both exporting and importing countries to desire relaxation of controls, suggests caution until full supplies are assured and comments as follows: "With the marked improvement in the world cereal supply position indicated for 1948-49, it is tempting to conclude that the types of grain shortages characteristic of recent years are over, at least for the years immediately ahead. Perhaps such a conclusion is justified, but for the next season or two a cautious approach suggests that both production in the deficit countries and exportable supplies in the surplus countries may recede somewhat. Much of the current year's advance in production is to be ascribed to a favourable season and not entirely permanent recovery. . . . "

Accordingly, until world supplies of wheat are clearly shown to be abundant, the Dominion cannot afford to relax in wheat production. As the price for wheat for 1949-50 will cover fully all costs of production, and special efforts have been made to provide adequate supplies of machinery, I feel justified in asking all farmers on wheat-growing land to endeavour to fulfil the target area of 250,000 acres. We have fallen short of this target in recent seasons, and to reach it next season means that work on the 1949-50 crop will have to start in good time. Normally worn-out short-rotation pastures intended for wheat should be skim-ploughed between December and March, and I make this appeal for wheat production now in view of this necessity for early preparatory cultivation of pasture land intended for wheat.

The cost of production estimates on which the price for each season's wheat is assessed allow for the full cultivation of grassland for wheat; they allow for skim ploughing, working up, and fallowing, as well as the subsequent deep ploughing and final cultivation before sowing, together with all other relevant costs.

Further, I feel that the Dominion should endeavour to maintain a wheat area of at least 250,000 acres as a long-term policy and that such a policy would be of benefit to the Dominion as a whole and to arable farmers in particular. In the past the wheat crop was largely the basis of arable mixed farming rotations and served a very useful purpose in providing a cash crop with an assured market. Also an immense amount of work has been put into improving wheat production, particularly by the Wheat Research Institute and the Department of Agriculture. Improved varieties have been bred, selected, and distributed to farmers, and fertiliser and variety trials have been carried out. This work has been responsible for increasing yields and quality, but unfortunately the acreage has declined. I feel, however, that this is a short-term decline and that farmers will again recognise that in the long-term view it is desirable to adhere to a regular cropping programme which covers both a period in pasture for lamb production and fertility building and a period in cultivation for supplementary fodder and cash crops. In selecting the crops, due attention should be given to the need to spread cultivation work evenly throughout the year and thus provide regular employment. The wheat crop, being normally winter sown, is very useful for this purpose and balances the cultivation demands of spring cereals and fodder crops.

The statement that the wheat crop depletes fertility is often made without full appreciation of the facts. The basis of modern farming is the adoption of rotations which maintain fertility, and the basis of fertility building is pasture. Our pastures are now much better than they used to be, because of the more liberal use of lime, fertilisers, and improved strains of grasses and clovers. If wheat is taken only once in the rotation on average land and rotated with properly-managed pastures, there is no likelihood of its depleting fertility; in fact, it enables the farmer to cash the fertility built by the pasture, which would otherwise not be utilised.

Thus in the knowledge that full costs will be allowed in the price fixed for 1949-50, I reiterate my statement that the Dominion needs at least 250,000 acres of wheat, and I appeal to all farmers on wheat-growing lands to make an all-out drive in the 1949-50 season to bring our wheat acreage up to this target.

EDWARD CULLEN, Minister of Agriculture.

A WARNING

LAMENESS IN SHEEP AFTER DIPPING

By L. K. WHITTEN, Parasitologist,
Department of Agriculture Animal
Research Station, Wallaceville.

IN recent years a peculiar form of lameness has occurred in sheep after dipping. Investigations briefly reported in the May "Journal" have shown that it is due to a specific bacterial infection which gains entrance through small skin abrasions and sets up an inflammation within the foot. Last season's experiments showed how control could be achieved by the addition of suitable antiseptics to the dipping fluid.

THE germ responsible is one which can grow in a foul dip wash, but it is easily killed by adequate concentration of arsenic, bluestone, or coal-tar preparations.

The ease with which the organism is killed by these substances explains why lameness did not occur with the older types of dips or with modern dips which contain these substances in addition to the more active insecticides. The lameness has occurred only with some dips containing derris root or "Gammexane" without suitable antiseptics.

The information obtained last season has enabled the Stock Remedies Board to take steps to ensure that all dipping materials on the market contain suitable antiseptic substances or that specific instructions are given on the labels for their addition when mixing the wash. Dips already containing arsenic or phenol in adequate amounts are considered safe, but those without require either bluestone or phenol to be added. The quantities recommended are 3lb. of bluestone per 1000 gallons of wash or 1 gallon of phenolic dip to 200 gallons of wash.

Bluestone should be used where possible because of its cheapness, but in certain circumstances the addition of a phenolic dip is necessary. With certain emulsion dips, where bluestone would affect the stability of the emulsion, or with a power spray unit, where the bluestone would react with the iron of the piping, a phenolic antiseptic is indicated.

It is therefore quite safe to use any of the dips on the market, provided they have been purchased recently and provided the manufacturers' instructions are followed exactly.

Farmers who wish to use dip purchased last season run a risk of lameness unless they follow the revised instructions covering the addition, where necessary, of a suitable antiseptic. If any doubt exists, inquiry should be made of the merchant from whom the dip was bought.

◆

Britain's Share of New Zealand's Meat Production

OF New Zealand's total meat production of 557,500 tons for the year ended September 30, 1947, 375,000 tons (67 per cent.) was exported to the United Kingdom and 165,000 tons (30 per cent.) consumed in the Dominion. Canned goods (15,500 tons) and supplies for the Pacific islands trade and overseas ships' stores (2000 tons) accounted for the remainder. Most of the canned meat, equivalent to between 8000 and 9000 tons of raw meat, also went to the United Kingdom.

BECAUSE of many complications, complete accuracy is not claimed for these details, which are taken in round figures from the New Zealand "Monthly Abstract of Statistics." However, the margin of error is considered to be small and the figures to be more accurate than any previous estimate. Killings at rural slaughterhouses and on farms were included in the totals, which are for bone-in weights.

Lamb (34½ per cent.), beef (31½), and mutton (24) made up by far the largest part of the total production of carcass meat. Veal contributed only 3½ per cent. and all types of pig meats 6½ per cent.

Lamb: Of 185,500 tons of lamb, New Zealanders consumed only 5650 tons, practically all the remainder going to the United Kingdom.

Mutton: A much larger proportion of the mutton stayed in the country—49,000 tons out of 128,500 tons. Again, practically the whole of the remainder was exported to the United Kingdom.

Beef: Less than half the production of beef went to the United Kingdom—81,650 tons out of 168,000 tons. New Zealand consumption in carcass form was 73,500 tons, and more than 12,000 tons was used for canning.

Pig meats: The United Kingdom received only a comparatively minor proportion of New Zealand's pig meats—9500 tons of a total of 35,000 tons. The 25,000 tons consumed in the Dominion included all the 1800 tons of choppers killed except for 25 tons used for canning. Of 8000 tons of porkers, 3500 tons went to the United Kingdom, most of the remainder staying in New Zealand. Of 25,000 tons of baconers, 6000 tons went to the United Kingdom and 18,500 tons was consumed in New Zealand. Islands trade and overseas ships' stores accounted for 100 tons of porkers and 450 tons of baconers.

☆

Fruit Crop Estimates for November, 1948

THE following estimates of the fruit crop for November, 1948, in 000's of bushel cases, are provisional and revised monthly for the period November to March and are summarised from information supplied by field officers of the Horticulture Division, Department of Agriculture.

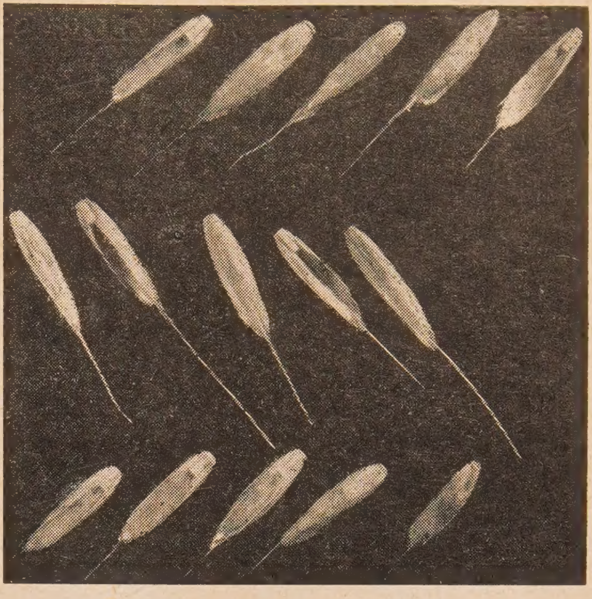
FRUIT	DISTRICT									
	Auckland	Gisborne	Hawke's Bay	Manawatu Wanganui	Wairarapa	Nelson	Marlborough	Canterbury North Otago	Central Otago	Total
APPLES—										
Ballarat	43	8	60	1	1	5	5	8	2	133
Cox's Orange Pippin	6	3	45	1	1	105	8	12	11	192
Delicious	33	5	80	2	5	133	20	21	44	343
Dougherty	18	5	50	—	—	18	2	—	—	93
Granny Smith	53	2	90	2	2	59	1	2	2	213
Gravenstein	25	—	30	—	—	42	1	1	—	99
Jonathan	9	—	40	—	2	213	20	13	21	318
Sturmer	4	5	160	5	14	285	21	45	29	568
Other varieties	89	7	130	4	3	106	18	49	43	449
Total	280	35	685	15	28	966	96	151	152	2408
PEARS—										
Beurre Bosc	4	—	3	—	—	5	—	—	—	12
Louise Bonne de Jersey	1	—	12	—	—	—	—	—	—	13
Packham's Triumph	6	—	4	—	—	2	—	—	—	12
P. Barry	4	1	11	—	1	3	—	1	—	21
W. B. Chretien	21	—	4	—	—	23	—	2	7	57
Winter Cole	2	1	45	—	2	26	1	5	3	85
Winter Nelis	—	1	35	—	—	6	—	2	6	50
Other varieties	18	1	43	2	—	9	1	5	3	82
Total	56	4	157	2	3	74	2	15	19	332
OTHER FRUITS—										
Peaches	44	6	260	—	—	49	4	7	87	457
Apricots	1	—	2	—	—	—	—	7	116	126
Nectarines	1	—	25	—	—	1	1	2	18	48
Plums	8	—	43	1	—	6	1	6	21	86
Cherries	—	—	1	—	—	—	1	2	8	12
Quinces	9	1	9	—	—	9	—	—	1	29

SEED PRODUCTION IN NEW ZEALAND

Italian Ryegrass

By R. G. JOLLY, Instructor in Agriculture,
Department of Agriculture, Christchurch.

AS a pasture plant in New Zealand, Italian ryegrass *(Lolium multiflorum)* plays an important part mainly in localities where short-rotation farming is practised. It is grown mainly to provide autumn, winter, and early-spring feed, but is also used to some extent as a constituent of pasture mixtures for semi-permanent pastures or hay crops. Italian ryegrass is a stronger-growing plant than perennial ryegrass, but is not so persistent. It is much broader in the leaf and is pale green compared with the dark green of perennial ryegrass. It is similar in its vegetative characters except that the leaf shoot is rolled and not folded as in perennial ryegrass. In the flower head Italian ryegrass may be easily distinguished, as the lemma or outer portion of the seed of Italian ryegrass is strongly awned and this awning is absent from perennial ryegrass. The recently-introduced strain of short-rotation ryegrass has most of the characteristics of Italian ryegrass, and differentiation between them is practically impossible even when the two are growing side by side. Short-rotation ryegrass is more persistent, but apart from that is very similar to Italian in its vegetative habits, and management and utilisation of the crop for seed production are practically identical.



Italian ryegrass seed (about 3 times natural size).

THE growing of greenfeed has always played an important part in mixed farming rotations. In addition to providing supplementary feed, it fits well into the cultivation programme of a paddock. Because of its quick growth and quick recovery after grazing, Italian ryegrass has replaced cereals to a large extent as a green fodder crop. It provides large quantities of highly-nutritious feed, keeps growing during winter, and does not suffer from frost burn to any extent. It does not deteriorate in spring as do cereals, and therefore provides good feed throughout the lambing period. Once the permanent pastures have reached full production, the Italian ryegrass stand may be closed, usually in September or October, and a seed crop taken in late December or in January.

A short-rotation ryegrass seed crop.

Place in Agriculture

Italian ryegrass is essentially short lived, reaching its fullest production in the first year. Many of the plants die out at the end of this period, so it is often sown in association with the slower-establishing clovers in seed-producing areas.

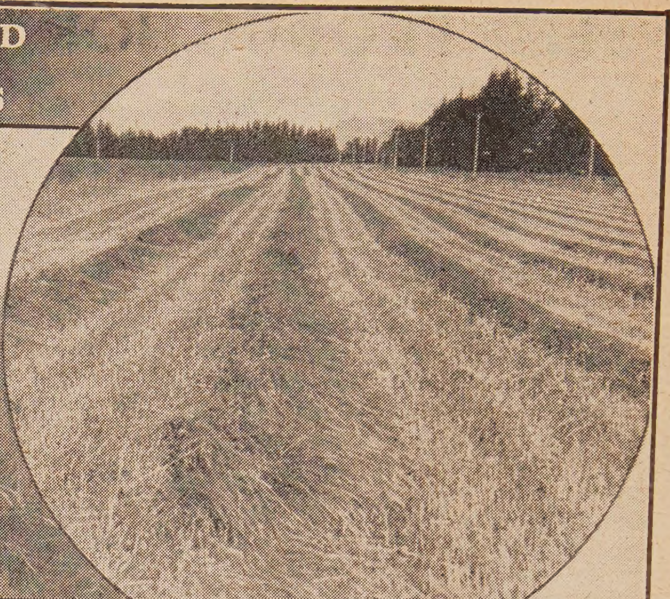
Because it is the most useful and the highest-producing of New Zealand's short-lived grasses, Italian ryegrass readily finds place as a major constituent of seed mixtures for temporary pastures. In association with red or white clover it gives a high-producing pasture in its first year. The usual practice is to sow it in February or March with red or white clover; this will produce feed in April, May, and later months. An Italian ryegrass seed crop is then taken, leaving a temporary pasture from which a clover crop is harvested in the second year. A second and even a third crop of clover is sometimes taken, and then the pasture is usually ploughed up.

Though the principal use of this grass is as an ingredient of temporary pasture mixtures, it may be included in a permanent pasture mixture. A small quantity will give an early bite of feed before the other grasses start to make growth. Care should be taken that only a small amount is included and that the pasture is grazed sufficiently early to prevent smothering of the more slowly-establishing grasses and clovers.

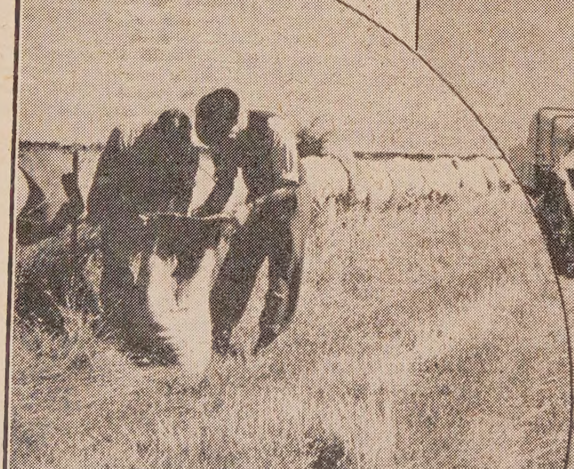
Where it is intended to save seed from the area ryegrass species should not be mixed, as the harvesting of them together was the direct cause of many inferior lines of ryegrass previously on the market.

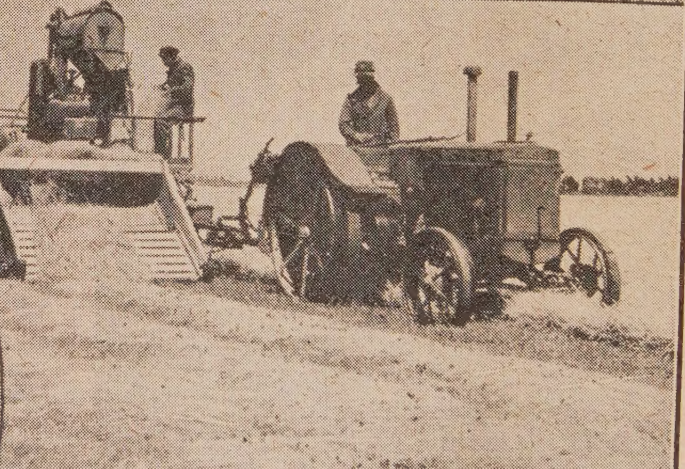
As a greenfeed crop, Italian ryegrass sown pure fits in admirably with the cultivation programme of a paddock, especially where the aim is twitch control. Sown down after repeated cultivation during a summer fallow, the ryegrass makes rapid growth and acts as a smother crop. In spring the area may be ploughed and fallowing continued if required or the land sown to a fodder crop.

HARVESTING OF ITALIAN AND SHORT-ROTATION RYEGRASS



Above—The most satisfactory way of harvesting Italian or short-rotation ryegrass is to cut it with a binder and later thresh it with a mill or header. Upper right—A short-rotation ryegrass crop maturing in windrows. Middle right—Short-rotation ryegrass in stook. Lower right—A header harvester with pick-up attachment threshing a crop from the swath. Below—Italian ryegrass seed being conditioned in an unfavourable season by being hung on a fence after being threshed.





ACREAGES OF ITALIAN RYEGRASS SAVED FOR SEED

Year	Hawke's Bay	Wellington	Rest of North Island	Nelson	Marlborough	Canterbury	Otago	Southland	New Zealand totals
1927-28	66	119	28	2	38	1,991	119	132	2,495
1928-29	9	57	55	17	74	4,186	321	88	4,807
1929-30	89	11	26	14	39	4,640	157	743	5,719
1930-31	281	167	128	24	24	9,600	768	1,099	12,091
1931-32	37	62	123	3	19	3,723	146	469	4,583*
1932-33	114	505	129	4	274	14,969	882	1,055	17,932
1933-34	28	111	87	8	11	5,044	770	882	6,941
1934-35	124	209	37	6	235	10,807	776	242	12,436
1935-36		199	38	3	68	11,104	815	837	13,073†
1936-37	5	71	7		22	4,355	600	543	5,603
1937-38	62	32	2		20	4,700	511	217	5,544
1938-39	100	67			27	5,347	1,065	418	7,024
1939-40	112	68	154		75	5,285	620	529	6,843
1940-41	76	69	16	5	97	13,186	824	961	15,234
1941-42	129	218	24	12	219	9,799	631	757	11,789
1942-43	40	68	14	30	106	8,021	609	702	9,590
1943-44	42	91	2	22	78	9,656	755	450	11,096
1944-45	69	62	6	12	131	15,537	882	848	17,547
1945-46	40	181	40	40	102	18,738	1,072	800	21,013
1946-47	115	210	58	21	370	18,058	1,201	1,098	21,131

* Includes 1 acre on the West Coast of the South Island.
† Includes 9 acres on the West Coast of the South Island.

A common practice is to sow a light seeding of Italian ryegrass when sowing turnips to provide a bite of greenfeed when the turnips are fed off.

Most Seed Grown in Canterbury

Italian ryegrass is grown on a wide range of soil types, but for seed production is confined mainly to drier areas with a yearly rainfall average of 24 to 35in. and where short-rotation farming is practised.

The table on this page giving the acreages saved for seed production over a 20-year period shows that the growing of Italian ryegrass for seed is confined almost entirely to the South Island. Canterbury produces about 83 per cent. of the seed grown. Climatic conditions in Canterbury are ideal for seed production, and as Italian ryegrass can be grown as a catch crop the saving of seed fits in admirably with the farm programme under arable farming.

Methods of Sowing

The seed may be either broadcast or drilled, but the general practice is to sow lightly through every coulter of a drill in 7in. rows. Where the seed is broadcast—usually only on the heavier soils—a good seed-bed is essential. If the land is well prepared after a fallow with periodical cultivation, and the moisture is present in the topsoil, good establishment may be obtained from broadcasting. However, lack of time in which to prepare a good seed-bed and absence of moisture from the topsoil are factors which often militate against good establishment by this method. Even when the seed is drilled, a good seed-bed is necessary.

The advantages of drilling over broadcasting are that the seed is sown in moist soil and that fertiliser can be sown with the seed, which on the lighter, drier soils is most advantageous for rapid establishment. Cross-drilling is adopted in many cases, half the amount of seed being drilled each way. A well-consolidated seed-bed is essential and care should be taken that the seed is not sown too deeply. Where the seed is cross-drilled, rolling between drillings is recommended.

The sowing of 1cwt. of superphosphate per acre is desirable, especially when clovers are sown in association with the ryegrass. Only where clovers are sown with the ryegrass is the sowing of lime essential; the amount depends on the future planned for the area, but whatever the purpose an application of ½ ton per acre will benefit the clover immensely.

In sowing areas for seed production it is essential in the interests of maintaining a high standard of quality that no uncertified seed or seed of another species of ryegrass be included in the mixture. It is also desirable to sow only one class of certified Italian ryegrass in the area in order that it may receive full recognition under the certification scheme.

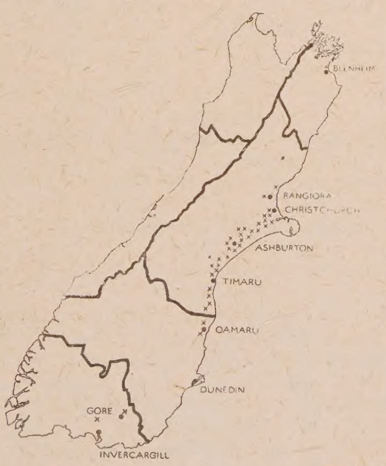
Rate and Time of Sowing

Where the saving of seed is the main objective, it is essential that the seed be sown sufficiently early to allow good establishment. In many cases Italian ryegrass at 30lb. per acre is sown alone, the area grazed until early spring, then closed and a seed crop taken. Such areas are then broken up and sown to another crop.

The more common practice is to sow 30lb. per acre of Italian ryegrass with 2 to 3lb. of white clover or up to 10lb. of red clover; the first year a grass seed crop is taken and the following year a clover seed crop. On the heavier type of soil and where soil conditions are good for establishment, seedings as low as 20 or even 15lb. of Italian ryegrass have been successful, but the more common rate is from 25 to 30lb. per acre.

For best results areas should be sown sufficiently early—in February or March—to allow good establishment before the cold winter weather sets in. Occasional sowings are made in April and May, but in few localities or seasons will the grass establish well or produce much feed when sown in these months. The risk of frost damage, especially when clover is sown with the ryegrass, is too great even when the seed is sown in April.

When sowings have been delayed until late autumn and a nurse crop is desirable, Algerian oats at the rate of 1 bushel per acre are sown as a protection against frost lift. Algerian oats are winter hardy and will produce winter feed as well as provide protection for the young grass.



The growing of Italian ryegrass for seed is confined almost entirely to the South Island. The crosses indicate the principal seed-producing areas.

For seed production spring sowings of Italian ryegrass are not satisfactory, as the plants do not have sufficient time to stool out before running up to seed, and poor crops result.

When the ryegrass is sown with clover, sowing too early in the autumn often causes harvesting difficulties. Under favourable conditions the clover establishes well and by harvesting time has grown up through the ryegrass, usually resulting in the crop lodging. In general, February and March sowings give the best results.

Grazing and Management

Management of an area before it is closed depends largely on seasonal conditions. Under favourable conditions, where the plants are well established and growth is well forward, the first grazing is usually taken from 6 to 8 weeks after sowing. The number of grazings obtained depends on weather conditions, but the earlier-sown crops may be grazed 3 or 4 times before being shut up for seed. To avoid waste and trampling of herbage, feeding off with large mobs of sheep is preferable. Where the growth has become rank or on large areas it is best to feed off in breaks. That applies more to the heavier types of soil, though under wet conditions it applies equally to the lighter soils.

Grazing should not be too severe at any time and should be arranged so that 1 to 2in. of leaf remains on the plants. Removing stock at this stage of growth allows quicker and better recovery of the pasture.

Late September to early October is a suitable time to close a field for seed. Areas where the soil has become pugged and consolidated through winter stocking benefit from 1 or 2 strokes of the tine harrows. In addition to breaking the hard crust of the soil, harrowing helps to spread stock droppings evenly over the field.

Harvesting

Areas closed for seed in September or October usually are ready for harvesting about the end of December or early January. Italian ryegrass sheds its seed very readily, and if it is allowed to become fully ripe before being harvested, considerable losses are likely. The crop should be cut when the seed is well developed and before it begins to be shed. The old test of pulling a few heads through the hand or sweeping a hat across the crop is still the best guide; if a few seeds come away from the heads when this is done, harvesting may be started. If ripening is uniform, no difficulties are presented, but crops which are uneven in ripening because of variation in soil present problems, and in such cases the farmer is faced with the difficult question of when and how to harvest his crop with the minimum of loss.

Because Italian ryegrass sheds its seed easily, the most satisfactory way of cutting the crop is with a reaper and binder, and if possible the crop should be handled in this way. Small sheaves should be made to allow thorough drying. The sheaves are then stooked and allowed to remain in stook for 10 to 14 days or even longer.

The crop is usually carted from stook and threshed with a threshing mill, but in many cases a mill is not available and threshing is done with a header, which is moved from stook to stook, the sheaves being fed on to the pick-up attachment. Only in the higher-rainfall districts of Southland and Otago is a crop sometimes stacked. Considerable seed may be saved when the crop is being carted to the threshing mill or stack if low trollies covered with bags or canvas sheets are used.

Though cutting with a binder is the most satisfactory method of harvesting, drying north-west winds are usually prevalent during harvest time, and in the more exposed areas in the major seed-producing districts that often makes harvesting with the binder impracticable. In such districts, or with a crop having a heavy undergrowth of clover, it is the practice to cut the crop and leave it in the windrow or swath. In areas where the risk of loss from wind damage is great, the crop is cut slightly earlier than usual. It may be cut with a mower and left in the swath, or windrowed by means of a windrower or mower with an inside divider attached or with a binder from which the binding gear is detached. The seed is allowed to mature and then threshed with a header harvester with pick-up attachment. The great disadvantage of this method is that if heavy rain falls while the crop is in the windrow or swath, the seed is beaten out on to the ground and lost, whereas if it is in stook, the seed is caught in the bands of the sheaves. Also, if harvesting conditions are unfavourable the crop may have to remain out so long that it is buried by new growth.

When a crop is being cut with a mower or windrowed, the width of cut should supply just as much material as can be handled easily by the header. Too much bulk results in faulty threshing. Generally, the cut should be the same width as the cutting bar on the header.

Often harvesting is delayed by unfavourable weather and the crop becomes too ripe to avoid loss of seed when it is being cut. In such crops considerable seed is saved if cutting or reaping is carried out during the cooler parts of the day—morning and evening. During the heat of the day the glumes holding the seed open and the seed is shed very readily.

Direct heading is resorted to only in very light crops, and this means of harvesting lends itself to the saving of seed on second-year areas which have been closed primarily for clover seed. The ryegrass is allowed to stand beyond the time when it is normally harvested, and when cut just above the clover flowers produces little straw, which when scattered by the spreading attachment on the header does not interfere with the clover crop. To allow thorough drying, the bags should be only half filled with seed, the mouths tied securely, and the bags hung on a fence. As a safeguard against heating, the bags should be turned periodically.

Many cases occur of Italian ryegrass seed heating in the sacks, and care should be taken that the seed is thoroughly mature before it is threshed.

Yields and Quality of Seed

Generally only one crop of seed is harvested from a stand, but in a favourable season a second crop is sometimes taken in the same season. On the heavier soils occasional good crops have been harvested in the second year. Usually such second-year crops are the result of the establishment of new plants from reseedings from seed which has been shaken or lost at harvest time. Such crops usually are too thin for handling with a reaper and binder, and the most economical means of harvesting is with a header harvester.

Climatic conditions before and after the area is closed cause yields to vary considerably. Climate governs the feed position in winter and early spring and therefore the time of closing the area for seed. In the lower-rainfall areas, where most of the crop is produced, seed production is incidental to feed for stock. If growing conditions are favourable, good crops are

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SHOW DATES

THE following are dates and venues of A. and P. shows up to the end of February.

December 14, 15, and 16—Southland A. and P. at Invercargill (Royal Show).

December 18—Otago Peninsula A. and P. at Portobello.

January 1—Nuhaka A. and P. at Nuhaka.

January 8—Blueskin A. and P. at Waitati.

January 14 and 15—Wairoa County A. and P. at Wairoa.

January 15—Waiau A. and P. at Tuatapere.

January 15—Waikouaiti A. and P. at Waikouaiti.

January 15—Tauranga A. and P. at Tauranga.

January 21—Palmerston and Waihemo A. and P. at Palmerston.

January 22—Waipukurau A. and P. at Waipukurau.

January 26—Marton District A. and P. at Marton.

January 28 and 29—Horowhenua A. and P. at Levin.

January 28 and 29—Taumarunui and District A. and P. at Taumarunui.

January 29—Tauranga A. and P. at Tauranga.

January 29—Helensville A. and P. at Helensville.

February 1 and 2—Feilding I. A. and P. at Feilding.

February 3 and 4—Feilding Ram Fair at Feilding.

February 5—Clevedon A. and P. at Clevedon.

February 5—Rodney Agricultural Society at Warkworth.

February 5—Woodville A. and P. at Woodville.

February 5—Golden Bay A. and P. at Takaka.

February 5—Hukerenui A. and P. at Hukerenui.

February 8 and 9—Dannevirke District A. and P. at Dannevirke.

February 10—Dannevirke Ram Fair at Dannevirke.

February 11 and 12—Taranaki A. and P. at New Plymouth.

February 11 and 12—Auckland A. and P. at Auckland.

February 11 and 12—Rangitikei A. and P. at Taihape.

February 12—Northern Wairoa A. and P. at Mititai.

February 12—Murchison A. and P. at Murchison.

February 12—Katikati A. and P. at Katikati.

February 12—Pahiatua A. and P. at Pahiatua.

February 16—Putaruru District A. and P. at Putaruru.

February 16—Opotiki A. and P. at Opotiki.

February 18 and 19—Ohura A. P. H. and I. at Nihoniho.

February 18 and 19—Masterton A. and P. at Masterton.

February 18 and 19—Franklin A. and P. at Pukekohe.

February 19—North Kaipara Agricultural Association at Paparoa.

February 19—Whakatane and Rangitaiki A. and P. at Whakatane.

February 23—Te Awamutu A. P. and H. at Te Awamutu.

February 26—Waitemata A. and P. at Waiwera.

February 26—Te Puke A. and P. at Te Puke.

February 26—Waiapu P. and I. at Ruatoria.

February 26—Waimarino A. P. H. and I. at Raetihi.

Italian ryegrass provides good early feed for ewes and lambs.

the rule; if growing conditions are adverse, low yields are usual. On the heavier soil types yields of 60 bushels per acre are not uncommon, and as high as 80 bushels has been harvested, but on the lighter soils 30 bushels of machine-dressed seed is considered a good yield. Dominion averages are about 20 bushels per acre.

Most Italian ryegrass seed is now bought on a machine-dressed basis, and after being threshed the seed is fowarded to seed-dressing firms for machine dressing. The loss in machine dressing varies with the quality of the field-dressed seed. With a good clean line of Italian ryegrass dressing losses may be as low as 10 per cent., but average losses usually are more than 20 per cent. Foreign seeds and inert matter such as pieces of straw and dirt are reduced to a minimum by machine dressing. The worst seed impurities and the hardest to dress out are goosegrass (*Bromus mollis*), hairgrass (*Vulpia* spp.), and well-developed ribgrass (*Plantago lanceolata*).

A good-quality line is bright, well awned, and of high purity and germination. For export, lines with a minimum of 98 per cent. purity and 90 per cent. germination are sought, and prices for all lines are based on this standard.

Strains of Italian Ryegrass

There has been considerable confusion about strains of Italian ryegrass. Certain alternative names such as "Giant Italian" and "Western Wolths" are used in the seed trade, but if these names ever had any real value, that value has now disappeared. True Western Wolths is certainly a distinct type of ryegrass of Dutch origin, making extremely-rapid growth but having little power of recovery after being cut. If this strain were ever present in New Zealand, in the intervening period it has lost its identity completely.

Much of the so-called Italian ryegrass seed being produced a decade ago consisted of inferior types resulting from indiscriminate hybridisation with perennial ryegrass, and after heavy dressing, which removed most of the awns present, this material was marketed alternatively as "ryegrass" or as "Italian," depending on the state of the market at the time for perennial and Italian ryegrass seed. This deterioration of type paralleled a similar deterioration in perennial ryegrass, but was not offset by the development of improved strains in certain localities as happened with the perennial species. As a result, the quality of the so-called Italian ryegrass seed on the market during the 1920's and early 1930's left much to be desired, and only with the imporation of fresh material from Europe about 1934 was the way prepared for an all-round improvement in quality. Consequent on this introduction seed certification was inaugurated, and it is significant that not one line of Italian ryegrass seed then on the market in New Zealand has succeeded in qualifying under this scheme. Parellel with the importation of this strain, the Grasslands Division of the Department of Scientific and Industrial Research began a programme of selection work on Italian ryegrass, which has led to the release of a pedigree strain markedly superior to the original importation in both production and recovery in the second season. This strain now forms the basis of seed certification.

Short-rotation ryegrass, which in reality is derived from a cross between perennial and Italian ryegrass, has been saved for seed on a commercial basis in the past 4 years. Methods of seed production resemble closely those employed with Italian ryegrass, and to this extent short-rotation ryegrass may be regarded as a strain of Italian.

A 30-month-old stand of Italian ryegrass and white clover from which a crop of ryegrass seed was taken in the first year and a clover seed crop at the second harvest.

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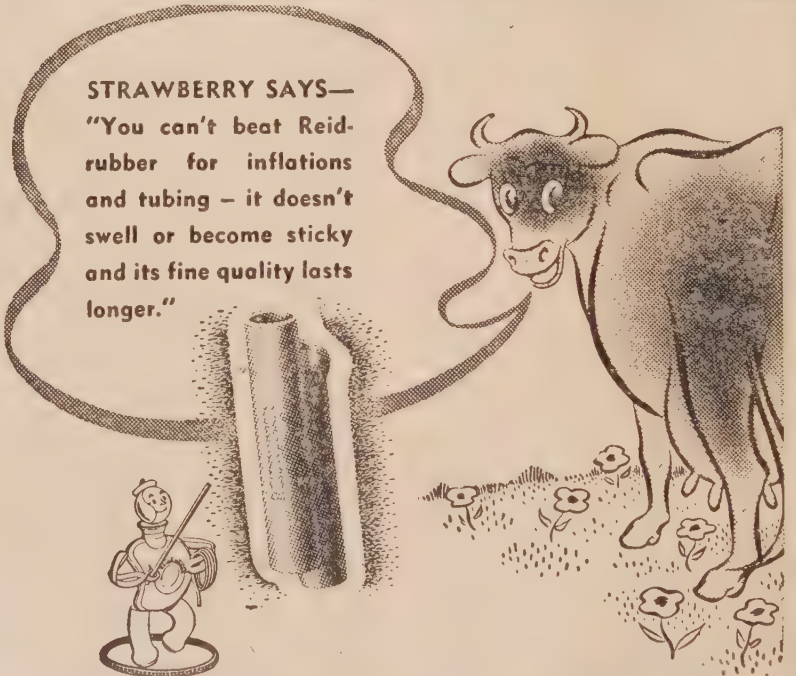
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ITALIAN RYEGRASS SEED PRODUCTION

The better establishment of ryegrass obtained by sowing seed in 7in. drills (right) than by broadcasting.

Seed Certification

A certification scheme covering Italian ryegrass seed was begun in the 1934-35 season, based on areas sown with seed recently imported from the Continent of Europe. This scheme operated until the release of the pedigree strain by the Grasslands Division in 1941, when it was gradually replaced by the present scheme providing for the following 4 classes of Certified seed:—

Government Stock seed: Produced on contract to the Department of Agriculture from areas sown out with nucleus lots raised by the Grasslands Division. To secure this class of seed, applications are made through a merchant to the Department of Agriculture.

Pedigree seed: The produce of areas sown with Certified Government Stock seed.

Mother seed: The produce of areas sown with Certified Pedigree seed.

Standard seed: Seed harvested from areas sown with Certified Mother seed.

Seed of the Pedigree, Mother, and Standard classes is procurable through commercial firms.

All crops entered for certification are inspected in the field to ensure purity of type, and before a line is finally tagged and sealed as Certified seed it must reach a minimum standard of purity of 98 per cent. Supervision of the seed through all stages of certification, from the time of harvesting to the machine dressing and final tagging and sealing of the sacks, is undertaken by field officers of the Department of Agriculture, and samples of the seed are plot tested later for confirmation of the type of plant.

The same provision is made for the certification of short-rotation ryegrass as for Italian ryegrass, with the exception that all areas are degraded a class after passing through two harvest seasons, whereas Italian ryegrass areas are degraded after the first harvest.

Insects and Fungoid Pests

Rust: Italian ryegrass is not susceptible to any serious insect or fungoid pests. Occasional crops may be affected with rust, but the damage is usually slight. In severe attacks ripening is immature and the seed light. There is no practicable means of control for rust, and the incidence of the disease is caused by climatic conditions.

Grass-grub and porina: In isolated cases stands 3 to 4 months old have been damaged by grass-grub and porina attacks, but in general the worst damage occurs in second-year stands where clover has been sown with the intention of taking clover seed crops. There is no control for grass-grub, but porina grubs can be controlled by the use of a bran, paris green, and molasses bait.

Blind seed disease: Italian ryegrass is less susceptible than perennial ryegrass to blind seed disease, but under favourable conditions this fungus does attack Italian ryegrass. Wet, humid weather at flowering time favours the growth of the fungus, which enters the seed and kills the embryo. The seed appears normal when harvested, but will not germinate. The Department of Agriculture provides a service whereby growers may have their crops tested for infection before harvest. Samples of heads representative of a

QUANTITIES OF ITALIAN RYEGRASS SEED CERTIFIED (Bushels)

	1934-35	1935-36	1936-37	1937-38	1938-39	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45	1945-46	1946-47
Manawatu					109								
Wairarapa											318	789	33
Marlborough				42		396	1,050	1,105	32	256	1,005	1,304	1,934
North Canterbury	2,982	5,175	726	1,901	868	1,886	3,083	1,932	4,560	6,628	9,530	9,716	9,146
Christchurch	Previously included in North Canterbury		5,833	5,082	3,876	8,998	18,223	12,655	16,534	21,487	51,001	82,364	50,689
Mid-Canterbury	855		1,070	1,891	955	1,421	4,290	706	5,598	13,842	49,758	42,947	27,491
South Canterbury	1,284	1,494	4,233	2,138	3,015	10,285	29,150	31,929	31,567	37,816	87.916	130,809	58,863
Waimate				Previously included in South Canterbury									12,997
North Otago			406	260	321	1,449	656	2,777	2,387	1,658	7,766	6,131	6,275
Maniototo											1,011	473	24
Central Otago											172	855	860
Otago			234	36			64			254		355	625
South Otago			47	882	178	169	513	587		46	311	743	1,506
Eastern Southland					403	621	1,838	2,339	2,521	934	1,706	1,636	3,075
Western Southland				1,400	655	1,149	1,309	2,477	660	940	7,475	6,841	8,088
Totals	5,121	6,669	12,549	13,632	10,380	26,374	60,176	56,507	63,859	83,861	217.969	284,963	181,606

EXPORTS OF ITALIAN RYEGRASS (Tons)

	1937	1938	1939	1940	1941	1942	1943	1944	1945		1946	1947
United Kingdom	3	31		150	634	1,073	375	743	Certified	1,117	264	52
									Uncertified	274	225	18
Australia	197	419	230	75	305	94	182	325	Certified	70	107	100
									Uncertified	367	159	95
South Africa	9	5	14	4					Certified		27	20
									Uncertified	1		8
Canada	1	4	2	2	3		3	5	Certified			6
									Uncertified	7	1	
France									Certified	84	13	120
									Uncertified	23	6	52
Belgium									Certified		40	296
									Uncertified		3	81
Finland									Certified			6
									Uncertified			20
Netherlands									Certified			15
									Uncertified			10
Other Countries	18*	1	2		3				Certified	11†	17†	
									Uncertified	6†	13†	
Totals	228	460	248	231	945	1,167	560	1,073	Certified	1,282	468	615
									Uncertified	678	407	284

* Includes 16 tons to U.S.A. † All to Eire.

crop should be forwarded to one of the local stations set up at convenient centres. The correct time to sample the crop is as near to the harvesting stage as is possible. After the seed has been tested the grower is advised of the percentage of infection present.

Wheat sheath miner (*Cerodonta denticornis*): Though the growing crop is remarkably free from insect attack, damage by the wheat sheath miner occurs occasionally in isolated areas, but so far it is not considered a serious pest. Damage in the crop is characterised by premature whitening of the seed heads. The wheat sheath miner is a small, greyish fly with yellow legs and one pair of transparent wings. The adult female lays its eggs within the leaf tissue. The eggs hatch out within a week and the grubs begin burrowing in the leaf tissue. The burrows are minute at first, but as the grubs grow the tunnels become larger and can be seen easily with the naked eye as white lines on the leaf. When these tunnels are numerous the flow of sap is cut off and the leaf wilts and dies. When the stems of plants are attacked the sap is cut off from the developing seed head and the damaged stems appear as white straws in the crop.

Exports and Prices

The area of Italian ryegrass saved for seed depends primarily on seasonal conditions, but the position is also influenced by price, which in turn is governed by overseas demand. Sufficient seed is always grown to meet the New Zealand demand, but of late years with the demand from overseas a considerable export trade has been developed. The United Kingdom and Australia have been the chief markets for a number of years, with Canada and the Union of South Africa buying small quantities. The table on this page shows the exports of seed during the past 10 years.

The price of seed has fluctuated during this period, but has shown a gradual increase from 6s. per bushel for Certified Mother seed before the war to 19s. in 1945, with a decrease to 10s. early in 1947; later in that year, because of the introduction of import embargoes by the British Government, Italian ryegrass became unsaleable for a period. The price paid for seed bears a direct relation to the export demand, and though the production and export figures show that about two-thirds of the seed crop is retained in the country, the price to growers is governed by overseas demand. That is further reflected in the price of 6s. 6d. per bushel offering for seed in 1948, when both production and export figures, were they available, would probably show a considerable reduction compared with those for recent years. Even at 6s. 6d. a bushel, though that does not compare favourably with the prices paid for other small seeds, Italian ryegrass is still a profitable crop to grow for seed.

A high-producing strain of Italian ryegrass has been developed to suit New Zealand conditions, but encouraging reports on the behaviour of this grass under their conditions have been received from overseas countries. Though the saving of areas for seed is regarded as of secondary importance to the production of feed for stock, seed production can add considerably to the farmer's income, and if the Dominion is to retain these overseas markets, the high standard of strain and quality must be maintained.

There has always been an export market for seed, but mainly to the United Kingdom. Because of the war this export market has increased considerably not only in the United Kingdom but in other countries, and New Zealand seeds at least temporarily have gained a market that hitherto had been denied to them.

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DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during October and for the 3 months ended October 31, 1948, with comparative figures for the same month and 3-monthly period of last year, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER— Period	Tons Creamery	Whey	Total	Tons Percentage inc. or dec.	Total in store at end of mth.
October, 1948	18,391	327	18,718	— 3.450	18,291
October, 1947	19,066	321	19,387	—	22,399
Increase or decrease ..	— 675	+ 6	— 669	—	— 4,108
For 3 mths. ended 31/10/48	38,246	636	38,882	+ 2.756	—
For 3 mths. ended 31/10/47	37,248	591	37,839	—	—
Increase or decrease ..	+ 998	+ 45	+ 1,043	—	—

CHEESE— Period	Tons White	Coloured	Total	Tons Percentage inc. or dec.	Total in store at end of mth.
October, 1948	10,659	172	10,831	+ 5.124	14,878
October, 1947	10,303	—	10,303	—	12,804
Increase or decrease ..	+ 356	+ 172	+ 528	—	+ 2,074
For 3 mths. ended 31/10/48	18,301	172	18,473	+ 10.312	—
For 3 mths. ended 31/10/47	16,746	—	16,746	—	—
Increase or decrease ..	+ 1,555	+ 172	+ 1,727	—	—

If these figures are converted into butterfat equivalent, there is an increase of 4.013 per cent. in butterfat graded for the 3 months compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which take place from time to time, they do not necessarily reflect actual trends of production on the farm.

DESTRUCTION OF QUEEN WASPS BY SPRAYING

By T. PALMER-JONES, Research Officer, Department of Agriculture Animal Research Station, Wallaceville, and B. W. DEVINE, Assistant Wasp Control, Department of Agriculture, Hamilton.

QUEEN wasps of the species *Vespa vulgaris* and *Vespa germanica* are attracted to certain plants and hedges in the spring by honey-dew excreted by insects infesting them. These plants act as natural lures and when sprayed with D.D.T. are converted into poisoned baits which provide a valuable means of destroying the queen wasp in its susceptible phase.

WIDE publicity has already been given to the fact that the wasp menace can be most profitably attacked by the destruction of the young queen when hibernating or in the early stages of nest building. The reason for this is that it is usually only the young, mated queen which survives the winter, and it is from these survivors that a new crop of nests comes when the warmth of spring is felt. Every queen killed means virtually one colony less.

With this in mind an intensive study was made of methods of attracting and destroying the queens in their susceptible stage.

Various baits were used in the hope of finding one which would attract the queen into a poisoned trap. Among a number tested were meat, fish, and chemicals; all were inefficient.

An aphis of the type which excretes honey-dew, thus making natural lures of the plants infested. Magnification is approximately × 30.

Only a short time was available for work on these artificial baits, and the possibility of finding a satisfactory one for the current season appeared slender. However, observations during field work revealed natural baits which can be poisoned and so provide a good prospect of securing a heavy kill.

These baits are the honey-dew excreted by insects on plants such as eleagnus, citrus trees, cypresses, and probably many others; the poison is a spray of D.D.T.

Citrus trees: In October it was discovered that queen wasps were attracted in large numbers by Lisbon lemon trees on two farms near Hamilton. A Poorman orange tree had the same attraction. None of these trees had been sprayed, and all were heavily infested with scale insects. Scale insects excrete honey-dew, and sooty mould indicating its presence was much in evidence, while some of the leaves were sticky. Close observation of wasps on the leaves showed they were not preying on insects, but were attracted by a substance on the leaf surfaces. On one of the farms wasps were noticed struggling on the ground under a Poorman orange and a Lisbon lemon tree, unable to fly, and exhibiting symptoms of poisoning. The same symptoms were observed in wasps on the leaves. Affected wasps kept in jars died in a few hours. A humble-bee was similarly affected. It was noticed that wasps appeared attracted particularly by leaves which were sticky with honey-dew.

There is no doubt that the wasps were attracted by honey-dew excreted by the scale insects. The honey-dew contains a poisonous principle which may be fatal to the wasp. Queen wasps only were seen on the trees and these were present in dozens.

Honey-dew is the sticky excreta from insects which feed on the sap of plants. Its presence on plants can be recognised by the stickiness of the leaves.

Eleagnus hedges: Wasps were reported in October on an eleagnus hedge surrounding a house at Whatawhata. Inspection revealed hundreds of queen wasps which were attracted to the hedge as in the case of the citrus trees. The hedge surrounded the house on three sides and the occupants had noticed wasps flying round it for weeks. Sooty mould was evident on the hedge, and some of its leaves were sticky with honey-dew. The hedge was heavily infested with the eleagnus aphis. Wasps were not preying on these, but were attracted by the surface of the leaves. A few wasps appeared slightly "drunk." Queen wasps only were seen on the hedge, and it was evident that, as in the case of the citrus trees, they were attracted by the honey-dew. Queens were much thicker on the hedge than on the citrus trees and could be caught in jars quite easily.

An eleagnus hedge surrounding a house about 150yds. from the infested hedge was uninfested with aphides. No wasps had ever been seen in its vicinity by the occupants of the house, and none was there when it was examined. In a survey of the district within a radius of 2 miles of Whatawhata six eleagnus hedges were inspected at a time when the infested one was attracting wasps in hundreds. All these hedges were free from insect infestation and no wasps were seen in their vicinity.

In a survey of eleagnus hedges at Te Kauwhata queen wasps were observed alighting on parts of a hedge infested with aphides. A hedge a few hundred yards away was uninfested with aphides, and no wasps were seen in its vicinity.

Surveys of eleagnus hedges in the vicinity of both Morrinsville and Te Aroha revealed no infestation with aphides and no wasps were seen.

Eleagnus hedges in Paeroa were found to be uninfested with aphides except for a very slight infestation of a small area of one hedge. No wasps were seen. Eleagnus hedges are usually infested in Paeroa with the aphis in November, and at this time queens were noticed on them last year in large numbers.

Queen wasps were observed in Cambridge alighting on an eleagnus hedge infested with aphides.

Flies and many other insects are similarly attracted to eleagnus hedges by the honey-dew.

Cypress tree: A very large ornamental cypress tree near Hamilton, which was infested with an aphis, was found to attract queen wasps even in torrential rain.

Other plants: There is evidence that hawthorn hedges, poplars, and cacti will attract queen wasps when infested with insects excreting honey-dew. No doubt many others will be discovered.

Experiments with different strengths of D.D.T. sprays were carried out on an eleagnus hedge. The D.D.T. was sprayed over the leaves, allowed to dry, and its effectiveness tested by removing leaves, running queen wasps over these once, and noting the effect on the wasps, which were kept in jars. It was found that a strength of 1oz. of D.D.T. per gallon was sufficient when sprayed over the leaves to cause immediate symptoms of poisoning in the wasps, followed by death a few hours later.

Wasp nests, as outlined in a previous article in the "Journal" by C. R. Paterson, can be dealt with effectively if discovered. Destruction of nests is important and should not under any circumstances be neglected. The necessity of this line of action has been still further emphasised by the observation that nests do not always die out in the autumn in New Zealand, but may persist over the winter, as has been observed in parts of the U.S.A., and produce queens that mate in the spring and have an early start in establishing new colonies. It is nevertheless preferable to destroy queens before they can establish a mature nest. For the first few weeks of nest building the queen is particularly vulnerable as she engages in foraging. Every queen killed at this stage means the destruction of a nest.

It is evident that many plants act as very effective natural baits when infested with parasitic insects. Queen wasps only have been observed on such plants, which is very satisfactory from the viewpoint of spraying. Hive bees are not attracted by this honey-dew. Plants might lose their attractiveness for wasps if D.D.T. sprays killed the insects which excrete the honey-dew. Fortunately, aphides and scale insects are generally resistant to D.D.T. Queen wasps are not repelled by sprays of D.D.T. in water.

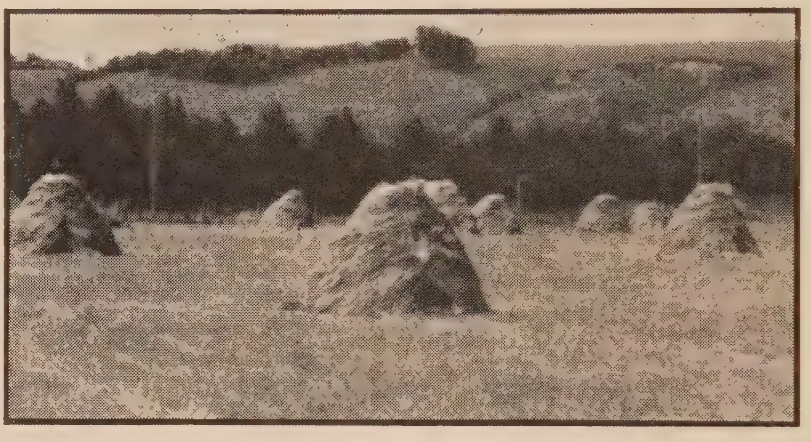
It is recommended that plants attracting queen wasps should be sprayed with D.D.T., using a strength of 1oz. of 100 per cent. D.D.T. per gallon of water.

The only D.D.T. preparations so far tried have been in the form of dispersible powders, which may be obtained from most merchants and consist of D.D.T. mixed with a wetting agent. Some powders contain 50 per cent. D.D.T and others 25 per cent. When preparing the spray, allowance should be made for these variations. The D.D.T. powder is thoroughly mixed with water and applied with a hand or power spray. Spraying should be thorough. The spray is effective for 2 or 3 weeks, but heavy rain will reduce its potency. The D.D.T. applied should be in a form recommended for use on plants, as certain preparations such as fly sprays contain chemical solvents which may injure plants. D.D.T. supplied by the Department of Agriculture for the destruction of wasp nests is unsuitable for spraying.

It should be realised that a lack of dead wasps in the vicinity of the plant sprayed does not mean that the spray is ineffective. Wasps receiving a lethal dose of spray may fly some distance before death occurs and their bodies may be very difficult to find.

Cocking will Save Hay from Weather and Ensure Better Quality

GOOD-QUALITY hay, and in fact hay of any quality, has been at a premium during the past winter in many North Island districts because of feed shortages as a result of the prolonged drought of last summer and autumn. Hay forms the basis of supplementary rations for wintering the main classes of farm livestock, and it should be held in plentiful reserve on all farms.



That these reserves are not always available was evident in the latest period of adversity, when large volumes of this invaluable foodstuff had to be transferred from far afield to meet the urgent need of drought-affected areas.

Apart from any deficiencies in quantity, hay unfortunately varies considerably in quality or feeding value. The quality of much of the hay examined during recent transfers suggests strongly that there is still considerable room for improvement in haymaking methods on many farms.

Over-mature, stemmy, bleached, dusty, or mouldy samples which are of mediocre to poor feeding value, and in some instances worthless, are neither good advertisements for the seller nor satisfactory to the purchaser.

Many factors may influence the quality of hay, not the least important of which are the quality or botanical composition of the sward from which it is cut; the stage of growth when cut; the methods adopted in curing and the weather conditions during that period, and the efficiency with which it is finally stacked or baled and stored.

The weather during the harvesting period may largely determine the quality of the resultant product, but the vagaries of the elements are too often used as an excuse for poor-quality material.

It is possible, and in most instances practicable, to circumvent the effects of unfavourable weather and thus preserve the feeding value and keeping quality of the original green material in the hay produced. One method used extensively in many overseas countries, but which appears to have fallen almost into disuse here, is that of cocking hay into small ricks whenever unsuitable weather threatens during the curing process before stacking or baling.

Material that lies too long in the swath or even in the windrow, to be bleached by the sun or saturated by rains, will not make good-quality hay. Too often under such circumstances it does not even make hay.

Material that has been allowed sufficient time to wilt and is then windrowed and made up into conveniently-sized and steep-sided, well-raked cocks, as shown in the illustration, will mature to advantage and turn more weather than that which lies on the ground during adverse conditions. In districts and seasons of uncertain harvesting weather cocking is well worthy of wider adoption.

Cocking involves additional time and labour and is perhaps not considered convenient or necessary in these mechanical and labour-saving times, but its adoption can often result in the saving of a part or all of the crop, or in the difference between obtaining a good-quality and a poor-quality or worthless product.

Carefully-cocked hay from good-quality, clean pastures, cut at the leafy stage of growth, will mature a product of good quality despite unfavourable weather.

Good-quality hay is what is needed, and it should be remembered that "the quality of hay is what you make it."

Detailed information on up-to-date methods of haymaking is contained in Bulletin No. 290, "Haymaking," which is obtainable free from the nearest office of the Department of Agriculture.

—A. R. DINGWALL, Instructor in Agriculture,
Department of Agriculture, Wanganui.

Carcass Quality Evaluation Scheme for Baconers

THOUGH pig producers frequently seek information concerning the best breed or best system of breeding for the production of bacon carcasses, no reliable data will be available until greater support is given to the carcass quality evaluation scheme by farmers. In this article A. Longwill, Assistant Superintendent of the Pig Industry, Department of Agriculture, Wellington, describes how the scheme is operated and how farmers can co-operate to ensure its success.

[*National Publicity Studios photo.*

New Zealand Wiltshire sides ready for either export or local trade. The carcass quality evaluation scheme aims to help the producer in the selection of profitable and high-quality pigs for these markets.

THE carcass quality evaluation scheme was instituted in 1938 to determine the best breed or cross breed for bacon production, but up to the present the number of pigs examined has been inadequate to enable a conclusion to be reached. It has confirmed the general impression that there are as big differences between strains within a breed as there are between different breeds and it has helped to confirm the value of certain strains.

However, nothing like the maximum use has been made of the scheme, and it is felt that if producers made themselves familiar with the scheme and used it to get information about their baconers and the quality of their breeding stock, they would not only be helping themselves directly, but collectively would be assisting the progress of the industry.

The scheme is a co-operative effort in which five people or organisations (the farmer, district pig council supervisor, buyer's agent and transport driver, works' staff, and the Department of Agriculture) take part and a full understanding by each person of his part in the scheme is essential to its smooth operation and success. Following is a brief outline of the operation of the scheme and the parts played by the different people in its administration.

The Farmer's Part

A farmer desiring to have his baconers examined under the scheme should advise the local district pig council supervisor that he wants reports on the carcasses. Only pigs bred by the farmer who has kept a record of the date of birth and breeding of his pigs can be accepted for marking under the scheme. Where pedigree animals are involved full details of breeding must be made available to the supervisor, who does the marking for identification purposes under the scheme. The copy of a form C.Q.S.1 given to the farmer when the pigs are marked must be forwarded to the works with the line of pigs or posted in previously with advice of the proposed date of consignment. If pigs are sold in the yards, the form should be handed to the buyer, who should be asked to ensure that the works are advised.

Work of Pig Council Supervisors

Information about the scheme is given to farmers in each pig council district by district pig council supervisors, whose first aim is to interest farmers using purebred boars. The supervisors arrange for the marking of pigs eligible for inclusion in the scheme and which will be taken to baconer weights.

The standard system of marking is by tattoo. All pigs from the same litter are tattooed with the same four-figure number. The range of numbers allotted to districts is as follows:—

Northland	10/01 to 19/99
Auckland	20/01 to 29/99
Waikato	30/01 to 39/99
Bay of Plenty	40/01 to 49/99
Taranaki	50/01 to 59/99
Tairawhiti	60/01 to 69/99
Wellington	70/01 to 79/99
Canterbury	80/01 to 89/99
Otago and Southland ..	90/01 to 99/99

The first two figures of each number are struck on the "near" side of the pig's neck and the two end figures on the "off" side of the pig's neck, on the thick neck "pad," and about 1in. from the median line on each side. Care is taken to ensure that the sequence of numbers is such that they can be read off by the grader at the works from "top" to "bottom." Other systems of marking are approved under certain circumstances where the supervisor obtains the agreement and co-operation of all other parties to the scheme and the approval of the district pig council, which bears the cost of any additional equipment which may be necessary for the departure from standard practice.

At the time of marking the carcasses the farmer's name and address are filled in on the C.Q.S.1 form, together with details of breeding and date of birth for each line of pigs, to which a separate number is given. This form is completed in triplicate, one copy being given to the farmer, one sent to the Superintendent of the Pig Industry, and the other retained by the supervisor. Where pigs of different sizes which will be sent to the works at different times are marked separate C.Q.S.1 forms are used so that the farmer has a separate copy to accompany each line of pigs to the works.

Buyers' Agents and Transport Drivers

When instructed by the farmer that he has had a line of pigs identified for the purpose of having them evaluated under the scheme buyers' agents and transport drivers are expected to point out to the works' yardman that pigs marked for the carcass quality scheme are among those delivered from certain farmers or a certain district.

Responsibilities of Works' Staff

Where a works agrees to co-operate in the scheme it undertakes to:—

1. Identify every pig marked for reporting under the scheme.

2. Measure the length and backfat at shoulder and loin, and record these, together with the weight of each marked pig.

3. Record the date pigs were killed, the grade of each marked pig, and any necessary remarks.

4. Make this information available to the supervising meat inspector for the works so that he can make a monthly return to the Director of the

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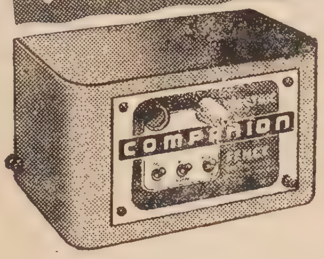

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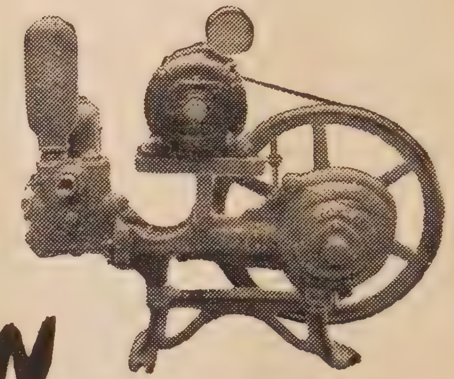

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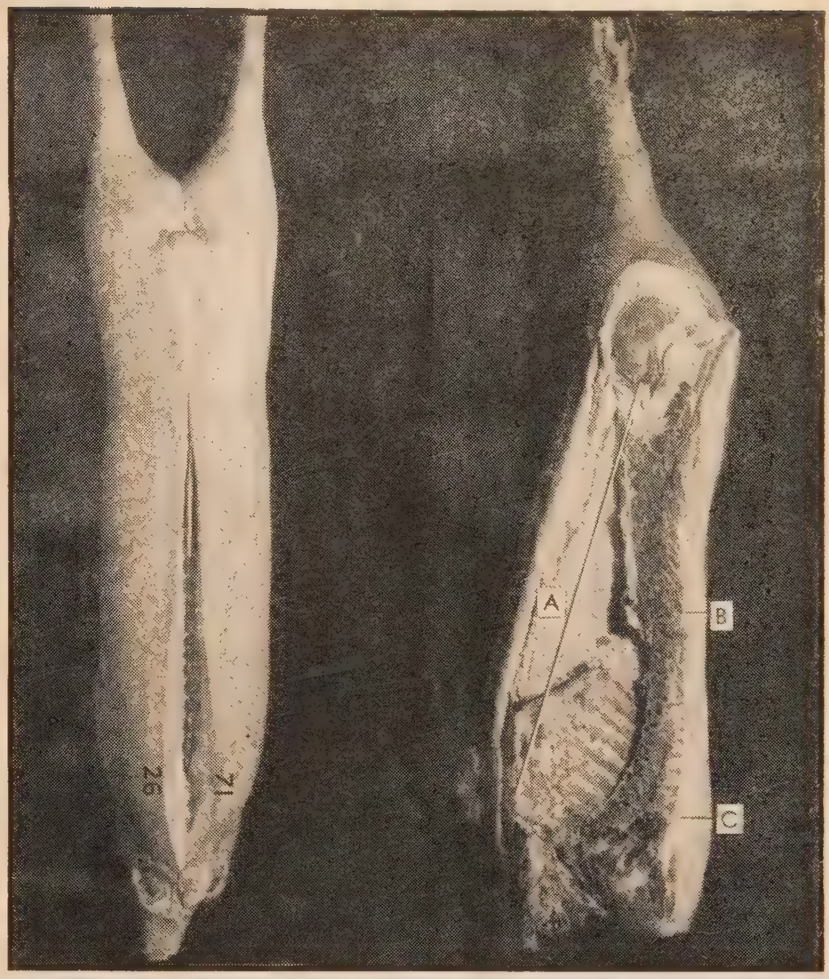
Livestock Division, Department of Agriculture, of all pigs recorded under the scheme which have passed through the works during the month.

Role of Department of Agriculture

The scheme is administered by the Superintendent of the Pig Industry, Department of Agriculture, who has charge of the following:—

1. Extracting information from the reports supplied to him and sending a report on a form C.Q.S.3 to the farmer, indicating the evaluation of his pigs for both carcass quality and growth-rate. This report gives both measurements and points for each pig for carcass quality factors measured in a manner similar to that shown in the table below. Thirty points are allotted for growth-rate, which is shown as pounds weight of carcass gain per day. In addition, 20 points are allotted for length, 20 for loin fat, and 10 for shoulder fat, making an aggregate of 80 points. Any score above 55 points overall can be regarded as satisfactory. The grade and any remarks about faults, rejection, etc., are shown on the report. Such information can be of the greatest value to the producer in his breeding and management practices.
2. Compiling records under the headings of the breeds and their various crosses. When sufficient pigs have been examined analysis of these records can give useful information on the question of breeds or breeding systems.
3. Sending periodic reports to breeders of registered purebred boars whose progeny are examined under the scheme, indicating as far as possible the breeding quality of such boars.
4. Making periodic analyses of the records on a breed, and, if possible, a strain basis, and publishing them to assist those interested in the improvement of their pigs, both pedigree and commercial.



[*Sparrow Industrial Pictures Ltd. photos.*

Left—A dressed carcass, showing the way the tattoo mark is applied on the "fat pad" on the pig's neck. Right—A side of the same carcass, showing where the measurements are taken. A—Body length. B—Loin fat. C—Shoulder fat.

Work on Scheme in Past Year

No reliable analysis can be attempted at present, as insufficient pigs have been marked to enable any valid conclusions to be drawn on the questions which the scheme is intended to answer. In fact, though during the first 3 years of operation of the scheme 1550 pigs were reported on, or a little over 500 per year, during the past 12 months only 430 have been reported on (64 in the biggest breed group).

From the four pure breeds and all their crosses there are at least 38 different possible breed groupings and it is estimated that to allow for such differences as those caused by strains within the breed, month of birth, climate, feeding, and treatment at least 500 pigs will be required in each group. With a concerted effort it should be possible to get sufficient pigs recorded in the main groups (purebred and first crosses between these) to give an accurate indication of which groups are worth concentrating on for baconer production.

The differences that do exist and the extent to which feeding and treatment are important will be apparent from the examples given in the table on the next page, which have been selected from among the pigs reported on under the scheme during the last year. Pigs have been reported on which have grown too slowly to score any points for growth-rate, but measurements on such pigs give no real information about their potential carcass quality and any which have a growth-rate appreciably less than .60lb. carcass gain per day have been excluded.

As pointed out in a previous survey of the scheme, published in the October, 1941, issue of the "Journal," poor growth-rate is a fault common to most of the pigs reported on. The table shows that with reasonable management it should be possible to achieve a better growth-rate. The standard set is the production of a 146lb. carcass in 200 days, and profitable baconer production demands this to be the aim.

Influence of Month of Birth

When the pigs are arranged in groups by month of birth an interesting result is obtained. Pigs born in January, February, and March are 60 days older than schedule in reaching average bacon weights of 140lb., those born in April, May, and June 23 days older, those born in July, August, and September 29 days older, and those born in October, November, and December only 10 days older.

This is in close agreement with the recommendation that, to fit pigs to the feed supply, farrowings should be concentrated in May and June and November and December. If this influence of the month of birth can be established beyond doubt, and this is possible only by the examination of a very large number of pigs, the time which many baconers have to be carried on the farm can be reduced considerably merely by changing the farrowing dates. The value of such a saving to the industry is worth consideration. Though carcass quality is important, it certainly does not outweigh in importance to the producer the attainment of a rapid-growing, profitable pig. Providing feed at the right time and proper attention are still the most important factors in getting rapid growth and maximum returns from pigs. On the other hand,

CARCASS QUALITY EVALUATION SCHEME FOR BACONERS

DETAILS OF SIX INDIVIDUAL PIGS REPORTED UNDER CARCASS QUALITY EVALUATION SCHEME

Parents		Date of birth	At slaughter		Growth-rate		Shoulder fat		Loin fat		Length		Grade	Total points (max. 80)	Comments
Sire	Dam		Age in days	Dressed weight lb.	lb. per day	Points (max. 30)	1/16in.	Points (max. 10)	1/16in.	Points (max. 20)	in.	Points (max. 20)			
B.21321	B.20075	8/10/37	231	159	.69	20	24	10	18	* 12	32	17	P.1	59	Good, average, lengthy Berkshire
B.21250	B.21118	1/12/47	183	142	.78	30	28	* 7	14	20	30¼	11	P.1	68	Similar type pig as above; better in early life and more profitable
L.W.7160	L.W.7034	5/9/47	279	192	.68	11	38	* 3	22	* 9	32¼	13	K.	36	Store stage before culling from a pedigree herd
L.W.7160	L.W.7034	5/9/47	214	126	.59	12	26	* 7	12	20	30½	16	P.1	55	Pig from same litter as one preceding; killed at earlier stage but still grown too slowly
Duroc J.	L.B.	11/12/47	145	163	1.2	30	38	* 0	26	* 0	31	9	P.2	39	Unsuitable bacon type; grown too fast
Duroc J.	L.B.	11/12/47	145	133	.92	30	28	* 7	19	* 4	29¼	10	P.1	51	Pig from same litter as one preceding; grown more slowly but still too fat

* Points lost because of excessive fat.

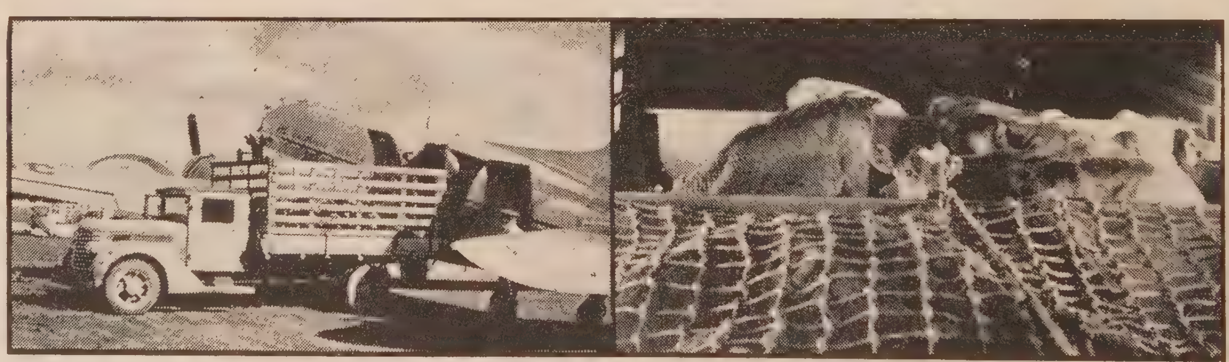
as shown in the table, growth-rate can be overdone to the serious detriment of carcass quality. A carcass gain of .65lb. to .80lb. per day should be the aim.

Backfat and Length

Backfat is generally satisfactory, though, as is shown by the table, there is some variation in this respect, depending on the feeding management more than any other factor. At baconer weights New Zealand pigs tend to be too fat, especially in shoulder fat measurements, a fault that is exaggerated at carcass weights exceeding 160lb. There is also room for considerable improvement in body length in all but a few of the best bacon-type pigs.

After a sufficiently-large number of pigs have been examined it will be possible to give definite information on the points discussed in this article and reliable answers to the many questions continually being asked by farmers. Only by the active co-operation of farmers will it be possible to obtain the number of pigs required. Farmers are asked to communicate with district pig council supervisors and have their baconers, whatever the breed or strain, tattooed for carcass evaluation. The service costs nothing and the only obligation on the farmer is to supply the date of birth of each pig and the breed of the sire and dam. This information is the foundation on which the scheme is built. Neither the age nor the breed of a pig can be ascertained from an examination of the carcass; otherwise it would be possible to obtain all the necessary information in any export slaughterhouse in about 2 months.

CALVES TRANSPORTED BY AIR



A GROUP of 25 grade Jersey calves bred from proven sires at the Department of Agriculture's Animal Research Station, Ruakura, was transported by air recently from Hamilton to Christchurch as ordinary commercial freight by the National Airways Corporation. The calves were required to improve the herd of the Winchmore Irrigation Station, Ashburton, part of which is devoted to investigating the possibilities of dairy farming under irrigation in Canterbury. It is also part of a scheme to test such Ruakura-bred calves under a wide range of climatic conditions.

The transport of young calves for that distance by ordinary methods presented some problems, but their consignment by air proved very convenient and reasonable in cost. The calves were loaded at Hamilton at 4 p.m., arrived in Christchurch at 7.30 p.m. and were delivered by lorry to the farm about 9 o'clock the same evening, all in excellent condition.

The illustrations show the ease with which they were loaded and their disposal within temporary pens in the body of the aeroplane.

THE HOME GARDEN IN JANUARY

By A. G. KENNELLY, Instructor in Vegetable Culture,
Department of Agriculture, Christchurch.

THOUGH the great flush of spring and summer growth is passing during January, most crop plants and weeds are still growing quite vigorously and therefore require attention. Growth from day to day may be less noticeable now than earlier in the season, but few keen home gardeners who have spent the Christmas holidays away from home have not been pleased on their return with the development of plants.

THE hoe should be used often and vigorously in January, because weeds are easily killed with it in the dry conditions which are usual then. Tomatoes should be pruned regularly and tied as they develop and those in the more humid northern districts should be sprayed with Bordeaux or suitable Government certified substitute against late blight. Successional sowings of salad vegetables should be made and celery and winter greens such as borecole, broccoli, brussels sprouts, savoy cabbage, and leeks should be set out. All members of the cabbage family should be sprayed or dusted to protect them against the caterpillars of the diamond-backed moth or white butterfly or against aphides. Potatoes should be earthed up and in northern districts sprayed to prevent an attack of late blight. Ground that will not be required for some time should be sown with a cover crop so that plant foods are less likely to be leached out and its organic content can be built up.

The runners of kumaras should be lifted periodically to prevent their rooting, and asparagus beds should be kept free from weeds. Liquid manure can be applied to most crops, and watering or irrigation may be necessary where conditions are excessively dry. January provides the last opportunity in most districts for sowing peas, dwarf beans, and carrots to mature before winter. Often the difficulty in small gardens is to find the space to make these sowings and winter plantings as well, because by mid-January most home gardens are filled with such vegetables as dwarf and climbing beans, carrots, potatoes, shallots, peas, spinach, turnips, lettuce, radish, and the various kinds of beet, all of which are easily grown for harvesting at this time of year. Pumpkins, marrows, cucumbers, outside tomatoes, and sweet corn should also be ready for harvesting in most districts.

Beetroot

Beetroot belongs to the same family as spinach and Swiss chard. There is a great range of shapes and sizes of beetroot and because of heredity and environment there is practically always some variation of individual roots in a strain. Types range from flat to deep oblate to round, oval, and globular and to half long and long. Beetroot is in fairly-consistent demand throughout the year and in most gardens it is advisable to make several sowings of different types in succession from early spring onward.

[*Photo News Ltd. photo.*

Beetroot is in fairly-consistent demand throughout the year and in most gardens it is advisable to make several sowings of different types in succession from early spring onward.

[*Sparrow Industrial Pictures Ltd. photo.*

Frequent hoeing in January will kill weeds easily in the dry conditions usual then.

Beet is a rather sensitive crop and temperatures should be reasonably high or there is likely to be a high percentage of seeders. If plants are exposed for a month at temperatures of 40 to 50 degrees F., they are likely to seed the first year; even growing them at temperatures of up to 60 degrees F. is likely to produce seed heads the first year, though the plant is a biennial, normally producing its seed head the second year. Early sowings are therefore usually confined to the flat, deep-oblate, or round types, which are harvested early. Seed should be sown thinly to avoid the necessity for thinning. Beet are likely to be lopsided if crowded, but fairly large thinnings may be pulled and the tops used as beet greens. The method often practised overseas of thinning again later by pulling alternate plants and cooking them complete with tops as baby beets is not favoured much in New Zealand.

The flat and round types of beet quickly deteriorate if left after maturity, but as both the top and root of all types of beet wilt more quickly than almost any other root crops, handling and storage require special care. Early beets are generally used after they reach about 1½in. in diameter and successional sowing is almost imperative where first-rate quality is required. Beet is often judged to a great extent by its colour, and good varieties that should develop a rich colour sometimes fail to do so. This is especially disappointing where the roots are to be exhibited at a show and is usually caused by certain environmental conditions, the chief of which is temperature. The substance responsible for colour in beet has been isolated and is known as beetaine.

Though it is not usually necessary for January sowings, soaking the seed in water for 24 hours will bring about improved germination, which is particularly important with early sowings. Beet seed is about ⅛in. long and a "seed" may be one or several seeds in a cluster or seed ball, depending on whether it was formed from one or several flowers. Even with thin sowing, therefore, there may be thick emergence because of the germination of several attached seeds.

It is customary in most parts of New Zealand to make a final sowing of beetroot in January or February. In central and northern districts the later sowings usually produce good crops, but further south, where the frosts of autumn are earlier and generally heavier, it is usually advantageous to sow early. Soil and manurial requirements are generally

THE HOME GARDEN IN JANUARY

Kohl rabi is largely grown as a cool-weather vegetable, but it is a very useful substitute for turnips in hot, dry weather.

similar to those for carrots, though beet is very much more sensitive to soil acidity. Lime, applied preferably some time before sowing, is usually necessary on soils not recently dressed. A rate of from 3 to 4oz. per square yard usually gives satisfactory results. The best-quality beetroot are grown on the lighter types of soil. For best results heavy dressings of organic manure should be applied to the previous crop, though on poor soils moderate dressings of well-rotted organic manure can be well worked in when cultivating the soil to the fine tilth which is desirable before sowing.

The application of additional plant food depends on the soil. Soil requirements vary greatly, but if an artificial fertiliser is required, one with a ratio of 1 part of nitrogen : 4 parts of phosphoric acid : 1 part of potash applied at the rate of 1½ to 3oz. per square yard is likely to suit a very wide range of conditions. The situation for beetroot should be open and sunny, as it rarely thrives if shaded, even if soil conditions are perfect.

At this time of the year varieties such as Detroit Dark Red, Crimson Globe, and Obelisk, or, where the autumn is favourable, Half Long can be sown. Non-bleeding beet, which as its name implies does not bleed when cut, is increasing in favour, as it retains its colour even when cut in pieces before cooking. Seed should be sown ½in. deep in rows 12 to 15in. apart and the roots thinned where necessary to 2 to 4in. apart (according to size) in the rows.

Carrots

Carrots are high yielding and easy to grow and to obtain a succession it is advisable to make several sowings. The housewife usually prefers young, medium-sized carrots, though it has been proved that large carrots contain as much sugar and usually no more fibre than small ones. A first small sowing is usually made in July or August as soon as the soil is in suitable condition, and small successional sowings may be continued at monthly intervals until December or January, though many home gardeners prefer to sow a main crop late in September or in October or November. In most districts January is the latest that seed can be sown to produce a crop before winter and in the colder southern districts December sowing is often preferred. Late-autumn (March or April) sowing to provide carrots for spring use is not advisable where winter conditions are cold enough to check growth severely. Even in favourable northern districts raised beds are usually an advantage and a warm, sunny situation is necessary. In general autumn sowing is rather risky and to ensure a continuous supply of roots throughout the year reliance should be placed on the summer and early-spring sowings.

Carrots are available in a great range of sizes and shapes and in shades of colour from yellowish-white to deep-orange-red. Flavour and texture, too, vary greatly. Carrots can be classified into three main groups:—

(a) **Short carrots,** which may be heart-shaped (Guerande, Oxheart, and Early Gem), oval (Early Scarlet Horn), and round (Early Forcing Horn and French Forcing).

(b) **Half-long carrots,** which are usually less than 8in. long. They may be tapering with a blunt tip (Chantenay and Nancy) or with a semi-blunt tip (Danvers and Tendersweet) or they may be cylindrical to the root tip with tapering shoulder (Nantes) or a straight shoulder (Touchon). This group includes the best-quality carrots and is more widely grown in commercial and home gardens than any of the other groups. Chantenay and Nantes are special favourites.

(c) **Long-rooted carrots,** which have tapering roots 9in. or more long of fairly-good quality (St. Valery and Intermediate) and of very fine quality (Streamliner and Morse Bunching). Most varieties grown for stock feed are also included in this group.

Short varieties are grown mainly for early or very late crops. They are also suited to shallow soils and to heavy retentive soils where pulling is difficult. The long varieties are usually much more difficult to dig, but when established are likely to be better adapted to dry conditions, as the fleshy part of the taproot is in the cooler, moister soil of the lower levels, though the fibrous feeding roots of both types range deeply. Seed should be sown ½in. deep in rows 12 to 15in. apart. In light soil thinning of most varieties is unnecessary. In heavier soils which tend to compact, or if large roots are grown, plants can be thinned 2 to 4in. apart.

Celery, Leeks, and Winter Greens

The main or late crop or a successional planting of celery can now be made as advised in last month's "Journal." Late-autumn or winter greens such as broccoli (winter cauliflower), brussels sprouts, kale, savoy cabbage, and leeks should also be set out by the end of the month, though planting may be delayed a little longer in favoured situations where the autumn is mild enough to permit the plants to develop before winter checks growth. Though their capacity for withstanding dry conditions varies a good deal (celery, for instance, must be kept reasonably moist, but kale will withstand some dryness), adequate moisture is essential for good growth and fine quality in all these crops.

Celeriac

Celeriac or turnip-rooted celery is a good substitute for celery and takes less time and much less trouble to grow. It has a turnip-like root with a characteristic celery flavour. The roots are mainly used; they may be boiled, used in stews, or sliced and eaten raw as a substitute for celery in salads. Even the leaf stalk can be used when it has developed well. Plants may be set out now, but as celeriac is not as well known as celery, few seedsmen sell plants, though most sell seed.

Because it is very hardy, does not require to be blanched, and succeeds on a wide range of rich, moist, well-drained soils, celeriac deserves to be more extensively grown by home gardeners who have a liking for the flavour of celery. Seed can be sown ⅛ to ¼in. deep in rows 15in. apart when

[Green and Hahn Ltd. photo.

Shallots should be graded to size when set out. They are very hardy and high in food value, and if weed growth is kept down and conditions are good, they yield heavily.

[*Green and Hahn Ltd. photo.*

Apart from watering and weed control, pumpkins, marrow, or squash should require little attention now. If the leaders are pinched back when about 18in. long, development of the laterals will be encouraged.

the ground has warmed in late September or October. Plants should be thinned to or set out 6 to 8in. apart. Earlier sowings should be made in boxes under glass.

Plants should not be set out deeply and should be liberally watered in dry weather. In very dry situations it is advisable to plant into shallow trenches to facilitate watering. Plants should be set out in a rich soil so that they make vigorous, continuous growth. During cultivation side shoots should be removed and the soil dragged away from the bulbous root, which should be kept trimmed of all suckers, as they tend to detract from its shapely development.

In districts which experience repeated severe frosts the roots can be lightly earthed up in autumn for protection, but lifting and storing is unnecessary except in heavy, poorly-drained soil in exposed situations. **Varieties:** Celeriac and Giant Smooth Prague.

Kohl Rabi

The flavour of kohl rabi is considered by many people to be superior to that of most members of the cabbage group. It combines the flavour of both cabbage and turnip and is grown for its edible bulbous "root," which forms somewhat after the manner of a turnip, except that the whole bulb is above ground. The "root" is actually an enlarged stem. To secure tender, succulent bulbs kohl rabi should be grown quickly. It should not be allowed to grow beyond 2½ to 3½in. in diameter, because if left to reach maturity, it becomes tough and stringy. It grows well in a soil that is well drained and reasonably rich in humus. Though it is often classed with turnips, it does well under a wider variety of conditions; in general its requirements are more similar to those of summer and autumn cabbage.

Kohl rabi is grown largely as a cool-weather vegetable, but is very useful as a substitute for turnips during hot, dry weather, when turnips are likely to fail, though even kohl rabi should not be permitted to become too dry or it may have a bitter flavour. Because of its superiority over turnips in this respect, January sowings of kohl rabi are often favoured. Generally seed can be sown from early spring, as soon as the soil is in condition for sowing, until February or even March if growing conditions are very good. Kohl rabi is very hardy and late summer sowings may be pulled as required until late spring. The bulbs do not keep well in store. Seedlings transplant well, but it is usually preferable to sow the seed ½in. deep in rows 12 to 15in. apart and later thin the plants to stand 6 to 8in. apart in the rows rather than transplant them.

Varieties: White Vienna, Purple Vienna, and Short Top Green.

Lettuce

Where a succession of lettuce is desired seed in January is best sown in the situation where the crop is to mature. Though lettuce, like such subjects as cabbage, beets, and tomato, transplants readily, its ability to withstand transplanting depends on several factors. In such plants damaged and destroyed roots are normally replaced quickly by new growth, but this depends on the ability of the roots to absorb water readily, and the relative ability to absorb water depends in turn on the amount of suberin or corky covering on the roots; the thicker or more distinct the covering the slower the absorption. Other factors such as the reserve of food in the plant are, however, also likely to be important. In January, when conditions are very dry, the check of transplanting, even if the work is done with the greatest care, is likely to be so severe that sowing in the place where the plants are to mature is preferable.

Lettuce thrives in cool, moist, well-drained soils and should be grown quickly or it tends to be tough and bitter. Seed should be sown thinly ¼in. deep in rows 12in. apart. The soil should be cultivated to a very fine tilth and it should be rich in organic matter.

Good varieties for sowing now are: Imperial 847 and Hanson (where conditions are very warm); Success and Wonderful (for average conditions).

Marrow, Pumpkin, and Squash

Apart from weed control and watering, marrow, pumpkin, and squash should require very little attention after the plants are established, as they thrive in a wide range of soils from sandy to moderately heavy, provided there is an assured supply of moisture (preferably held in suspension in the soil) and plenty of organic matter. Well-drained, light, warm, aerated soils are best for early crops, but for main crops heavier soils usually give a higher yield over a longer period. Organic matter can be increased by digging in a green crop.

Though it is usually most satisfactory in the home garden to grow plants in "pockets" of organic manure, the plant food requirements of pumpkins, marrows, and squashes are not especially high. The heavy applications of organic manure often recommended are usually advised more for their physical effect on the soil (that is, the greater cohesion and moisture-holding capacity they give, or if they are fermenting, their warming influence) than for their plant food values. Manurial requirements vary greatly according to soil types, but in general a fertiliser containing about 5 per cent. of nitrogen, 10 per cent. of phosphoric acid, and 5 per cent. of potash applied at the rate of from 1½ to 3oz. per square yard gives good results even without the addition of organic manure, provided the soil already contains a reasonable amount of organic matter.

Trailing varieties of marrow, pumpkin, or squash usually benefit if the end of each leader is pinched out when about 18in. long, as this encourages the development of laterals. Plants can be trained by pegging the runners with sticks. The fruit of marrows is best cut when young, preferably before the skin hardens, so that it cannot be broken easily with the thumbnail. About 10 to 12in. is a good size, as the bigger marrows become the greater is the relative area devoted to seed and the less flavour they have. In favourable seasons, too, the more fruit is cut the more will develop. Pumpkins and squash should be cut as required, but, like marrows, they keep better if allowed to mature properly.

Onions and Shallots

Weed control is particularly important where onions and shallots have not yet reached maturity. Weeds not only use up available plant food, but when conditions are damp tend to create an environment unfavourable to the ripening of the bulbs. Though shallots are usually ready for harvesting in January, those that were planted late or are still growing well should, like onions, be kept cultivated to induce them to grow to maximum size.

Peas

In most districts January is the latest month for sowing peas which will mature before winter. A quick-maturing variety should be chosen, and in most southern districts it is advisable to sow early in the month. Peas thrive in cool but not cold conditions, and a moist, deeply-cultivated, well-drained soil containing adequate humus is best. Soil preparation should be thorough. The ground should be deeply dug and where necessary organic material such as compost or farmyard manure should be incorporated, preferably some time before sowing, though peas usually do best following a crop that was well manured with organic and inorganic manure. The addition of superphosphate at the rate of 1 to 2oz. per square yard has proved beneficial on most of the heavier soils that have been kept in good condition by adequate manuring with organic material or by the digging in of green crops, but on the lighter soils a complete fertiliser containing about 2 per cent. nitrogen, 10 per cent. phosphoric acid, and 4 per cent. potash is likely to give better results. It should be applied at 1 to 2oz. per square yard. Too-heavy manuring, particularly with nitrogenous organic manures, tends to promote excessive vegetative or "straw" growth and makes the crop more liable to disease.

Lime is essential on most soils and can be supplied by an annual dressing of 3 to 4oz. per square yard. Seed should be sown in V-shaped or broad, flat drills usually drawn out with the hoe. Drills should be 2 or 3in. deep, except where conditions are hot and dry, when they should be considerably deeper so that, though the seed should not be covered with more than 2in. of soil, the roots will be well down in the cooler and moister soil of the lower levels. This is very important where conditions are dry or where heavy wind is likely, as the plants can be gradually earthed up the stems as they develop. Dwarf varieties should require no other support.

Protection of newly-emerged peas against birds is essential in some districts, though birds are mainly troublesome in early spring, when food is in short supply and is lacking in variety. Pea guards made of wire netting are most effective, provided the ends are blocked, but they should be removed before the peas become entangled in the wire. There are numerous other methods of protection, but their effectiveness depends on thoroughness of application and other factors. Spraying with bitter substances such as an infusion of alum or quassia in water (with soap as a spreader) or dusting the rows with sawdust, lime, sulphur, or superphosphate gives varying degrees of protection. Cotton stretched over the shoots is also effective if a number of strands, which may be criss-crossed or stretched in parallel lines, are used.

Most seedsmen's catalogues give a list of varieties with heights and the approximate number of days each variety requires to mature.

Popular dwarf varieties are: W. F. Massey (syn. Kelveden Wonder), Blue Bantam, Earlicrop, and Little Marvel.

Potatoes

Potatoes should be dug in immature condition only when they are needed for immediate consumption or if the land is required for another crop. Though it is usually necessary to dig early varieties before the plants have reached maturity, it is advisable where there is sufficient ground to arrange digging so that the main crop is left until quite mature. If potatoes for keeping are dug in an unripe state, there is likely to be heavy loss in storage. While top growth is healthy and vigorous tuber development will continue. Potatoes are mature when the skin of the tuber is firm and will not rub off easily. Main-crop potatoes are usually dug in late autumn and where the tuber moth is not troublesome they can be left out for a day or two after digging, as rain or a slight frost or two will usually help firm the skin and make bruising of the potatoes less likely when they are handled.

The potato tuber moth is small and light-brownish-grey, the body of the female being about ¼in. long. It lays 20 to 30 eggs and the point of infestation is usually the eyes of the tubers. The grub of the potato moth causes two distinct forms of injury. First, the tops of the growing plant are affected early in the season, when the young plants may be destroyed by the grubs feeding on the leaves and tunnelling in the stems, and, secondly, the tubers are attacked if they are exposed while growing or if allowed to remain in the field for any length of time after digging. Serious infestation of the tubers may also occur in store.

Control measures include the planting of clean seed, spraying with arsenate of lead to kill the young grubs early in the season, adequate moulding so that the tubers do not become exposed, bagging as soon as possible after digging, storage in uninfested bags, and closing and either up-ending or storing the bags at once. The tuber moth also attacks weeds such as henbane, nightshade, and thorn-apple and also other crop plants such as tomato and tobacco. The weeds should be destroyed and the crop plants sprayed with arsenate of lead at the rate of 1¼oz. to 4 gallons of water. When Bordeaux is being applied against potato blight on potatoes or tomatoes the Bordeaux and arsenate of lead can be combined.

Freshly-dug new potatoes are very popular and where there is sufficient space and if the season's potato requirements are not already met, it is a good plan to plant a row or two of an early variety so that new potatoes may be dug in late autumn or early winter. Such a late planting is not always successful, as much depends on the weather. Very dry conditions or early frost may check development of the tubers, but where space permits and new potatoes are sufficiently prized it is a worthwhile undertaking. Several good early varieties were listed in last month's "Journal."

Spinach Substitutes

The culture of two excellent substitutes for spinach, tampala and New Zealand spinach (*Tetragonia expansa*) was described in the October, 1948, issue of the "Journal." Both can be sown now where conditions are too hot and dry for ordinary spinach. They are quite vigorous growers and are preferred by many to ordinary spinach. Seed of New Zealand spinach should be sown 1 to 1½in. deep (according to whether the soil is heavy or light) and at least 2ft. apart each way. Germination is often slow and seed can be soaked 12 hours before planting and then sown in groups of 2 or 3. When the plants have become established the weaker in each group can be removed. Tampala is obtainable in two varieties, one green leaved and the other green variegated with red,

[*Sparrow Industrial Pictures Ltd. photo.*

Sweet corn can be grown on a wide variety of soils, but best results are obtained on warm, well-manured, medium or light loams. In very exposed situations it is advisable to stake the plants.

and should be sown thinly ½ to 1in. deep in rows 15in. apart and later thinned to 10in. apart.

Sweet Corn

In very exposed situations it is advisable to stake sweet corn, but in most situations earthing up the stem will provide all the support necessary. Suckers often develop, but there is no evidence that their removal promotes earliness or increases the number or weight of the ears on the stem. Sweet corn is an annual and bears separate male and female flowers. The tassel is the male inflorescence; the ear is the female. Pollination normally takes place as soon as the silks appear and development of the cob should be rapid thereafter; the edible stage is usually reached 2 to 4 weeks later according to temperature, usually when the tassel has just withered. Maturity is commonly tested by thumbnail pressure. The young grains are first watery inside, then milky, then doughy, and, finally, the "dent" stage is reached when the grains are too hard to be palatable.

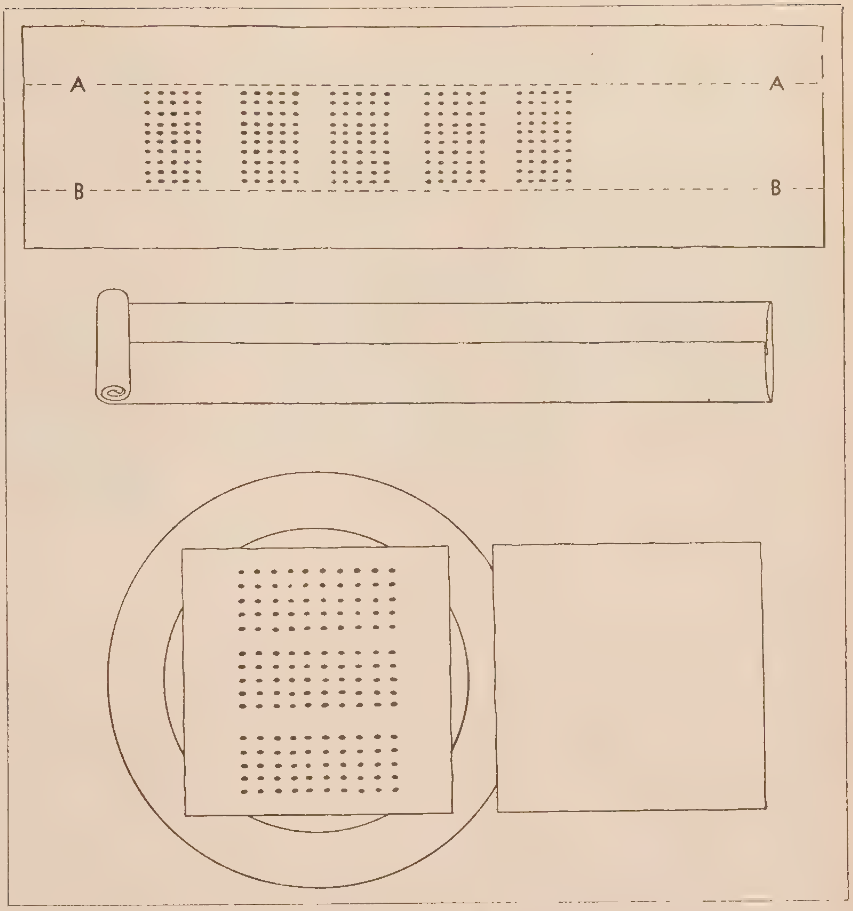
The cob should be harvested with a gentle jerk or cut with a sharp knife when the milky contents of the grain to thicken but are still milky.

Swedes

In northern districts where conditions are not too dry and a reasonably-long growing season is assured seed of swede turnips can still be sown as advised in last month's "Journal." Swedes are high yielding and richer in plant food than ordinary turnips and are especially useful during winter.

Seed Testing

Though vegetable seed is generally inexpensive, home gardeners occasionally have some old or valued strain that they wish to grow, but the viability (capacity for sustaining life) of which is in doubt. In such cases the seed should be tested first, as several weeks may be lost by sowing seed which is no longer viable. Though the proper testing of seed requires laboratory equipment and training in the special techniques employed, the home gardener can carry out simple tests to determine within limits the viability of most kinds of vegetable seed. Testing should always be undertaken where the age and vitality of the seed are in doubt. Failure of seed to germinate or plants to emerge above ground may be due to many reasons other than low vitality of the seed and therefore a knowledge of the percentage of germination that may be expected from a particular line of seed, together with other relevant information, is particularly useful in the determination of seeding rates. It is also useful when prompt germination before a certain date is essential to enable the crop to mature before the advent of adverse weather.



The germination of seed can be tested simply by arranging groups of seed in multiples of 10 on a strip of cloth or several thicknesses of blotting paper, as shown in the upper illustration. The cloth is folded at A and B and rolled up in the "rag doll" form shown in the middle illustration. Another easy method is to arrange the groups on a piece of saturated cloth or blotting paper on a plate (as shown in the lower illustration) and cover them with additional wet cloth or blotting paper. An inverted plate should be placed over the top and the seed should not be in free water.

The two simplest methods of testing are by the use of either a "rag doll" or several thicknesses of blotting paper or cloth, as shown in the illustrations on this page. Seed to be tested should be laid out in a single group or several groups of, say, 10, 20, 50, or 100. The seed should then be covered by folding the cloth or placing more blotting paper or cloth over it, and the seed should be kept moist but not saturated in a situation where ordinary room temperatures (about 65 to 75 degrees F.) prevail. The seedlings should be counted as they appear and the percentage of germination calculated. Ninety per cent. is considered good, 75 to 80 per cent. a fair average, and 50 per cent., and in most cases even 60 per cent., is poor. Seed shoots or seedlings that are abnormal or very weak should not be counted and should be discarded. The time taken for different kinds of seed to germinate varies considerably and the optimum temperature range for germination also varies among the commoner vegetables from, for instance, spinach (39 to 46 degrees F.) and peas (39 to 65 degrees F.) to cucumber, musk melon, and egg plant (about 77 to 86 degrees F.). Home garden testing at room temperature is not as haphazard as might be indicated by the above temperature requirements, however, because temperature range for vegetables is generally fairly flexible and variation from the optimum is not likely to exceed that met with in normal field practice. Where time permits and suitable temperatures can be maintained the best way for the home gardener to test seed is to sow it and count the number of seedlings that establish themselves beyond the stage where they rely on the reserves within the seed coat. Twenty, 50, or 100 can be sown in a very small box and should require little attention beyond watering. The soil in the box should be arranged in three layers so that finely-sifted soil is on top, medium to coarse in the middle, and lumpy soil at the bottom to provide drainage.

Different seeds have peculiarities in germination. Light influences the germination of certain seeds (for example, grass seed and lettuce) and some seed will germinate more quickly if subjected to variable temperatures. Commercial seed is always cleaned before it is sold and where possible the home gardener should remove impurities such as dust and chaff and weed seed in home-saved seed.

PHALARIS TUBEROSA IN HAWKE'S BAY

By R. P. HILL, Fields Instructor,
Department of Agriculture, Hastings.

THE inability of perennial ryegrass to reseed during consecutive dry summers in Hawke's Bay has meant the disappearance of much of this grass from pastures, and with the resultant opening up of the pastures and the thinning of turf, the soil is exposed to erosion. A new grass must be found, and *Phalaris tuberosa* appears to be an ideal constituent of all hill-country pastures in the low-rainfall belt, not to take the place of perennial ryegrass, but to assist in maintaining a sward and in checking erosion.

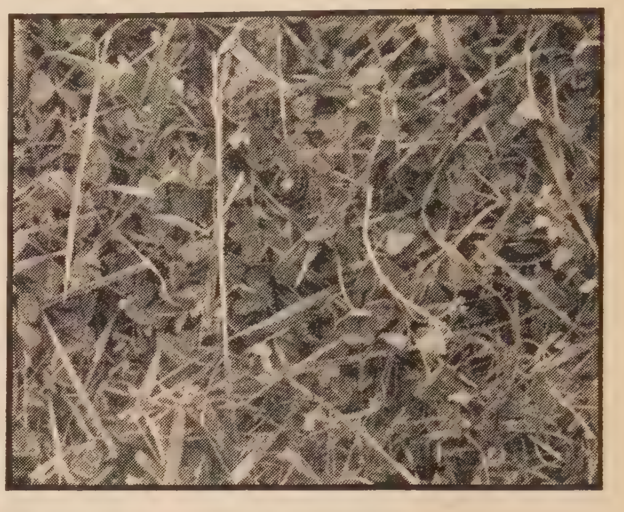
MOST of Hawke's Bay has an adequate and well-distributed annual rainfall, but there are areas in which the distribution is not so even and in which are some of the most fertile soils. Once perennial ryegrass is introduced here it provides, with white and subterranean clover, sufficient feed throughout the years to maintain ewe flocks and to fatten lambs, cattle, and sheep. In normal years its growth ceases from December and it is dormant until the autumn rains in March, when it again provides ample feed.

Unfortunately, in some seasons when the dry season starts in November and continues with virtually no rain for from 4 to 5 months the extreme dryness, together with the great heat of the sun, may kill out quite a percentage of the ryegrass plants; but if the seasons immediately preceding such a dry summer have been good, which is normally the case, there is usually sufficient fallen seed for the ryegrass to re-establish.

Series of Dry Summers

There are times, however, when dry summers follow dry summers, and the season 1947-48 was the third in such a series. During the summer 1945-46, which was remarkable for one of the worst droughts on record, all pastures, particularly on hill country, were badly damaged and there was no reseeding; 1946-47 was again a dry summer during which practically nothing seeded, and the following summer of 1947-48 was again extremely dry and hot.

At the height of the drought: Perennial ryegrass has died out and winged thistle has taken charge, except where *Phalaris tuberosa* is growing.



The ideal sward: A *Phalaris tuberosa*, perennial ryegrass, subterranean clover, and white clover pasture photographed in November.

The consequence of these three consecutive dry summers has been that much perennial ryegrass has disappeared; the pastures have opened up and the turf is thin. The damage, however, has not stopped here; having very little ground cover, the soil is now exposed to wind and sheet erosion, which, if not checked, will have disastrous consequences to the fertility of the land; the topsoil—the most fertile—is disappearing into gullies and watercourses.

Drought-resistant Grass Needed

A new grass must be found, not to take the place of perennial ryegrass, but to assist it in maintaining a sward. Cocksfoot cannot make much headway under the close grazing conditions of dry seasons, and it would appear that *Phalaris tuberosa*, a canary grass, is worthy of much wider use in the low-rainfall belt.

Phalaris tuberosa has been used for many years in Australia in the low-rainfall areas where perennial ryegrass will not grow. There it is known also as Toowoomba grass. It is a true perennial and is not aggressive. Its roots are swollen at or near where the stem penetrates the ground, which apparently enables it to store up sufficient moisture to withstand dry conditions.

Ideal for all Dry Hill Pastures

Co-operative experiments with this grass were laid down in Hawke's Bay on various farms both in the very low and medium-rainfall belts, the earliest being started 10 years ago. In all cases the grass has established well and during dry periods was providing feed. It would appear to be an ideal constituent for all hill pastures where dry conditions prevail and where soil erosion is taking place.

There has been difficulty in establishing *Phalaris tuberosa* included in a grass-seed mixture in parts of New Zealand where the rainfall is high, but such difficulty does not occur in Hawke's Bay, where it has been established sown with cocksfoot, ryegrass, white and subterranean clover, and also as a pure sward. It is not recommended that it be sown as a pure sward, but rather as an ingredient of a general mixture.

A seeding rate of 3 to 4lb. per acre is ample, though a heavy sowing of up to 10lb. per acre will naturally provide a much quicker establishment.

The grass is very succulent and greedily eaten by all stock, which never seem to allow it to seed, so that it takes a considerable time to spread from the original plant. Once established it will remain in the pasture until removed by ploughing, and will provide that ground cover so essential if sheet erosion is to be checked.

Phalaris tuberosa provides a steady winter growth.

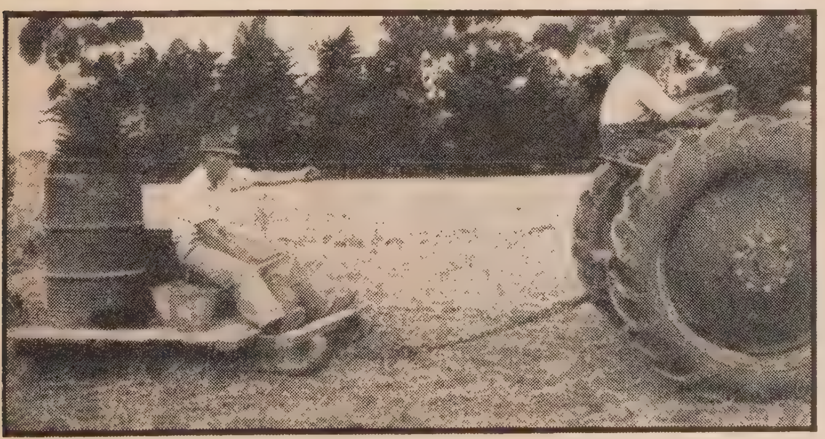
Success of Poison Baits in Eradicating Crickets

HAURAKI PLAINS farmers have received enthusiastically the results of extensive trials in the eradication of crickets. Poison baits containing "Gammexane" or D.D.T. have proved completely successful in exterminating this pest and at a cost for materials of 3s. 6d. per acre. The results of the experiments and methods of making and applying the baits are described in this article by G. L. Banfield, Instructor in Agriculture, Department of Agriculture, Thames, who collaborated with W. Cottier, Plant Diseases Division, Department of Scientific and Industrial Research, in conducting the trials.

Crickets devouring the poisoned bait.

CRICKETS (*Gryllolus servillei*) are common and widely distributed throughout North Auckland and the Hauraki Plains, and a small area in Hawke's Bay is also subject to attack. On the plains the pest has been prevalent since the land was originally broken in and caused extensive damage as far back as 1911, but only periodically do the attacks reach the devasting proportions of those of the past 2 or 3 seasons. About 1929 some 900 acres in the Pipiroa district of the Hauraki Plains were almost completely depleted of pasture, largely as a result of damage caused by crickets.

These periodic attacks of greater severity result from a series of unusually-dry summers after exceptionally-wet winters, both of which lead to excessive cracking of the ground. The cracks provide the crickets with a refuge from their natural enemies.



Bait being broadcast from a tractor-drawn sledge.

Most cricket eggs appear to be laid in March, though considerable numbers appear in February. They are whitish-grey, cigar-shaped objects about 1/10in. long and can be found deep in the crowns of pasture plants or in cracks in the ground. "Nymphs," which hatch out from early October onward, resemble the adult insect, but are wingless and very much smaller—so small that they may go unnoticed for another month or so.

The young nymphs mature over a period of months, during which they undergo a series of moults. With each moult they increase in size and the wing buds become larger, until full development is reached in late summer and autumn.

Heavy Clay Soils Most Affected

Crickets are associated almost entirely with soils which crack badly during summer, mainly the heavy clay soils, and these are the only ones on which crickets reach plague proportions. That is well demonstrated on the Hauraki Plains, the area of infestation by crickets coinciding almost completely with the area shown on the soil survey map as Hauraki clay—some 40,000 acres. Crickets usually occur to a less degree on the clay hills and less frequently still on volcanic soils, but are seldom found on sandy loams.

Where a good vigorous pasture cover is maintained cracking is reduced to a minimum and crickets are not so troublesome. In general, pastures which have become open as a result of winter pugging or excessively-hard grazing are most prone to cracking and hence to cricket infestation. It is noticeable that where pastures have not been adequately controlled by grazing or mowing cracking of the ground and consequent cricket infestation are more likely. Not uncommonly a farm heavily infested adjoins another which is remarkably free, undoubtedly because of a difference in pasture management.

However, though cracking of the ground is governed to a large extent by pasture management, there appear to be areas where, despite apparently-good management, excessive cracking is inevitable, and on such areas some more direct means of cricket control is essential to the well-being of the land.

Nature of Damage

The cricket can be compared with the locust and army worm in its mode of attack, concentrating entirely on the portion of the plant above ground. One of these voracious insects can devour a blade of grass an inch or so long in a very short time, and as the pastures become depleted the crickets chew deeper into the crowns of the plants.

Though these pests start feeding on herbage from the time they are hatched, not until they approach maturity in February and March do they make their presence felt. Possibly much loss of production occurs before this stage, but pasture growth is probably rapid enough up to this time to conceal any damage done by the insects. Three or four days after the extermination of the crickets experimental plots became conspicuous by their increased grass growth, suggesting that more production loss is caused by the crickets than might be suspected.

POISON BAITS FOR CRICKETS . . .

Butterfat-production figures on one Hauraki Plains farm give some indication of the seriousness of this pest. The pastures on this property were eaten out by crickets 3 years in succession. Three years ago production was about 20,000lb. of butterfat a year; last season production dropped to 6000lb. and grazing had to be obtained off the farm, in addition to which resowing of damaged pastures during the period cost more than £800.

Crickets leave pastures open in autumn, allowing the ingress of buttercup and docks, the seeds of which germinate at that time. Much of the heavy buttercup infestation of the plains probably is attributable to this factor.

Susceptibility of Pasture Species

Paspalum is generally considered to be resistant to cricket attack, but experience has shown that even this grass is attacked when no other pasture is left. Ryegrass appears to be the most susceptible of all, and a stage may be reached where only clover and paspalum remain. Later the clover follows the fate of the ryegrass, so that finally only an odd clump of paspalum may be left.

However, paspalum-dominant swards, because of their ability to prevent the soil from cracking, are relatively safe from attack.

Previous Attacks on Pest

In the past little attempt has been made to combat the pest. Though arsenical baits have been suggested by the Entomology Division of the Department of Scientific and Industrial Research, little attempt has been made to put these recommendations into practice. Had these baits been given a proper trial, quite possibly they would have proved successful.

One farmer tried a type of harrow with converging rows of tines with the idea of squeezing the cracks together and eliminating the homes of the crickets. That was not successful because it did not accomplish what was aimed at and also broke up the surface of the ground and provided additional cover for the pests.

Fairly-severe harrowing after a fall of rain was tried by another farmer. The entrances to the cracks were closed temporarily, and crickets could be seen hopping about bewilderedly, but it was not long before the entrances of the cracks were cleared by the insects, and more harm than good was done to the already-weakened pasture by this treatment.

Poison Baits Most Successful

Last season experiments were carried out on the Hauraki Plains employing dusting, spraying, and baiting methods with the relatively newly-discovered insecticides "Gammexane" and D.D.T.

Dusting the pastures at rates of up to 60lb. per acre with D.D.T. and "Gammexane" dust was ineffective, so no further trials were carried out with this method.

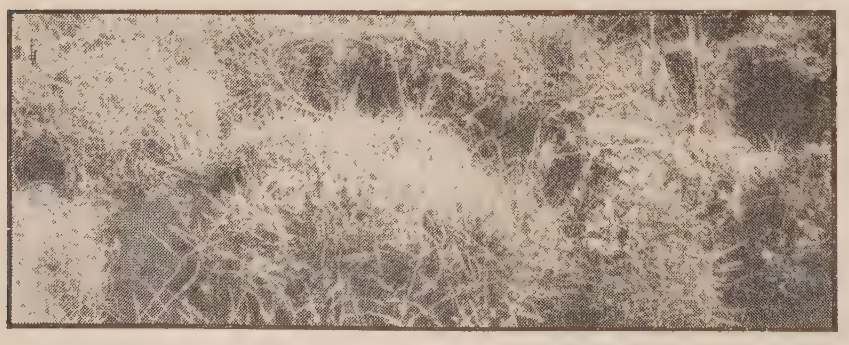
Both the use of poison baits and the spraying of pastures with these insecticides eradicated crickets from the treated areas and appeared to be equally effective, but because of the greater cost and difficulty of spraying on a large scale, all further trials were confined to the poison bait method. Another factor is that if pastures were sprayed, clover and other flowers would be contaminated, with almost certain danger to bees.

Baits containing "Gammexane" give very rapid and spectacular results. Dead crickets appear within an hour of the laying of the bait, and after 24 hours not a single cricket is left alive. On the trial plots the dead crickets numbered 30 to 40 per sq. yd. Baits with D.D.T. as the active agent appear to be equally effective, and no live crickets can be found on treated areas after 24 hours, but the slower action of the D.D.T. allows the crickets to retreat into the cracks in the ground before they die.

Composition of Baits

Baits used in the original trial contained 24lb. of bran and 4lb. of molasses per acre. In view of the high cost and shortage of bran, trials were carried out to determine the minimum amount necessary, and rates as low as 12lb. per acre appeared to be satisfactory. Where molasses was ommitted from the bait results were less satisfactory.

Later the cost of the bait was reduced very substantially when it was found that sawdust was completely satisfactory as a substitute for bran. As the sawdust can be obtained from mills for the cost of cartage, there would appear to be no point in applying less than 24lb. per acre, which is a very convenient amount to apply. Molasses at 4lb. per acre is essential when sawdust is used.

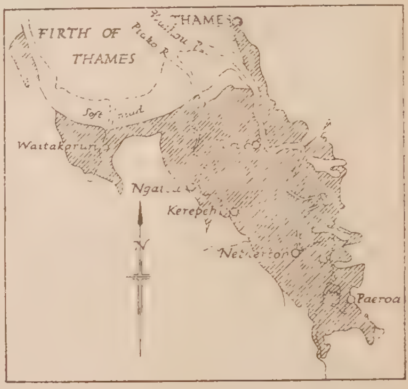


Poached land on the Hauraki Plains, a condition which predisposes to soil cracking and consequent cricket infestation.

The trials showed 1lb. per acre of D.D.T. of 10 per cent. strength to be the minimum effective rate. After the success of the trials 50 per cent. D.D.T. was used by farmers on the Hauraki Plains, this being the strength at which this insecticide was available in quantity; at this strength only 1/5lb. is necessary to treat an acre.

The recommended D.D.T. bait to treat 1 acre is 24lb. of sawdust, 4lb. of molasses, and 1/5lb. of 50 per cent. D.D.T.

"Gammexane" could be obtained in reasonable quantity last season only in the form of a well-known brand of sheep dip, and 4oz. per acre of this gave completely satisfactory results. This dip contained 6.5 per cent. of gamma isomer benzine hexachloride, which is the active insecticidal ingredient in "Gammexane." In future it is expected that a special "Gammexane" preparation containing 2.6 per cent. of gamma isomer benzine hexachloride will be available under the name "Agrocide 7." It is designed specially for preparation of baits for locust control in overseas countries. A trial was carried out to determine the minimum quantity of "Agrocide 7" to treat 1 acre, 6, 8, and 10oz. being tried. As all three strengths appeared equally effective, less than 6oz. may also be effective, but in view of its strength compared with that of the sheep dip on a gamma isomer basis, much less than 6oz. would appear unlikely to be satisfactory.



[*Map drawn by Head Office, Lands and Survey Department.*

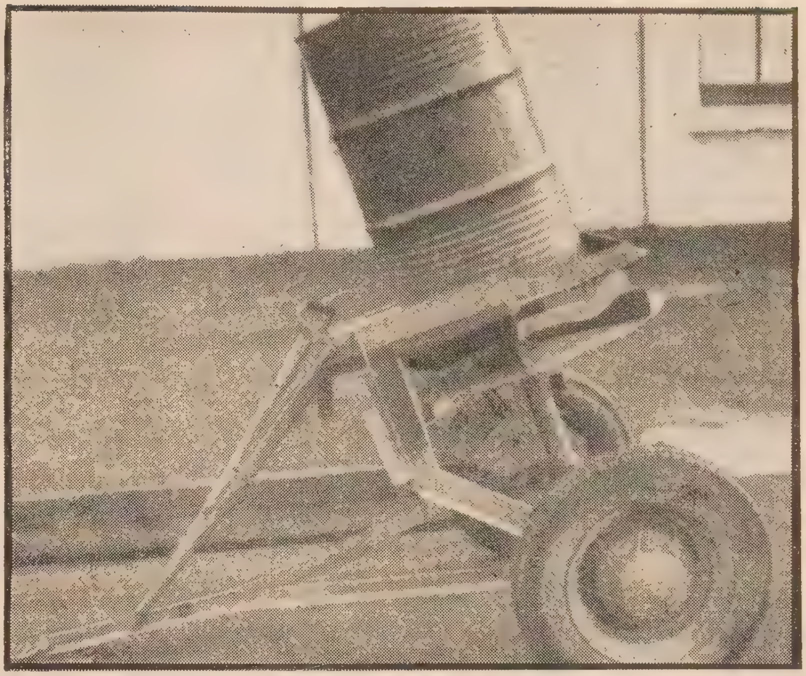
The shaded part of the map represents the Hauraki clay soil, which is most liable to cricket infestation.

The recommended "Gammexane" bait to treat 1 acre is therefore 24lb. of sawdust, 4lb. of molasses, and 4oz. of "Gammexane" dip or 6oz. of "Agrocide 7."

Mixing the Bait

The use of a concrete mixer is essential if a large quantity of bait is to be mixed, and experience has shown that only bait for 1 acre can be mixed satisfactorily at a time.

Insecticide in powder form should be thoroughly mixed with dry sawdust



A specially-designed bait spreader which has given good results.

before the molasses, dissolved in hot water, is added. Sufficient hot water is used to dissolve the molasses, and cold water is added to make a fairly-dry mash.

If the insecticide is in liquid form, as in the case of the sheep dip, it should be stirred thoroughly into the molasses and hot water before the liquid is mixed with the sawdust.

As a small amount of poison has to be incorporated with a large bulk of sawdust, care in mixing is essential.

Method of Application

The bait is broadcast on to pastures similarly to grass seed. Farmers have found hand broadcasting from a tractor-drawn sledge satisfactory. With one man mixing and two men sowing the bait, 5 to 6 acres an hour can be treated.

However, there is ample scope for further mechanisation. Apparently ordinary fertiliser topdressers have been used with complete success at Canterbury Agricultural College, Lincoln, for distributing bait for control of porina caterpillar. Two types of machine were used—an 8ft. horse-drawn topdresser capable of covering 12 acres a day, and a 14ft. motor-truck topdresser which can cover 80 acres a day on this class of work with all materials ready mixed. No difficulty was experienced in applying the bait provided it was not made too moist.

In the "Journal of Agriculture" for February, 1943, L. J. Dumbleton, of the Plant Research Bureau, Cawthron Institute, described a specially-designed bait spreader, capable of covering 10 to 20 acres an hour, which has given very satisfactory results. The article stated that plans and specifications of the machine would be made available to anyone who wished to have one constructed. The expense would not be warranted except for communal ownership or contracting.

Bait collected from a treated pasture after a fortnight and applied to an untreated area appeared just as effective as when first sown, and crickets which fed on dead or dying crickets apparently obtained a lethal dose.

No Danger to Stock or Bees

Overseas research has proved that animals are able to ingest without ill effect considerably more D.D.T. or "Gammexane" than they would be able to pick up from treated pastures, and that has been borne out by experience in New Zealand. Even fowls fed on fowl mash treated with "Gammexane" or D.D.T. appeared unaffected.

As it was thought possible that bees might be attracted to the bait by the molasses in the mixture, a careful watch was kept for dead bees on treated pastures, but none was found. A beekeeper whose apiary almost adjoins two treated farms did not notice any undue number of dead bees around his hives. As a very severe test, a tray full of bait was placed in the midst of a group of hives, but even that was ignored by the bees.

Cost of Materials

The cost of the "Gammexane" in the form of the sheep dip or of the D.D.T. (50 per cent. strength) to treat an acre at the recommended rate is approximately 2s. The "Agrocide 7" which will be available this season is expected to cost about 7½d. to 8d. to treat an acre at the recommended rate. Molasses to treat an acre costs about 1s. 6d., and sawdust can be obtained for the cost of cartage from the mill.

Even if two treatments are required during a season, which is not expected, the cost would be negligible compared with that of having to resow a pasture because of the ravages of crickets, let alone the loss of production.

Time for Treatment

As the trials were carried out late in the season, no experience is available to indicate the best time to apply the bait, but it is considered pastures would be best treated after the maximum emergence period is over so that as many crickets as possible can be accounted for. Not until the crickets are approaching maturity is their presence felt, and the eggs are not laid until this mature stage is reached. Therefore just before they reach this stage would probably be the best time to treat the pastures.

As the crickets emerge from the cracks in the ground in greatest numbers when the weather is warm and sunny, such days would appear to be best on which to carry out treatment. During the trials it was found that in cold weather a longer time was required to clean up a pasture.

Overseas Experience

In countries where locusts, crickets, and grasshoppers cause regular and severe damage, "Gammexane," D.D.T., and other new insecticides have been the subjects of exhaustive trials.

For the control of locusts, tests were carried out in South Africa to find suitable substitutes for sodium arsenite as the poisonous principle in baits, and "Gammexane" was found to be completely satisfactory. A mixture of equal parts by volume of bran and sawdust proved to be as satisfactory as pure bran for baits, but pure sawdust was unsatisfactory. The success of pure sawdust used in the trials on the Hauraki Plains is no doubt the result of including molasses in the mixture.

Considerable work with the new insecticides has been carried out in Australia. They have been applied in the form of baits, dusts, sprays, and insecticidal fogs with varying success, but the use of baits is still the accepted method of control in all countries. Tests carried out in New South Wales suggest that the distribution of insecticides from aircraft is not very suitable for dealing with infested pastures because of the necessity for ideal climatic conditions.

The advent of such insecticides as "Gammexane" and D.D.T. has opened up a new field in the scientific war against insect pests. Amazingly-low concentrations can be used at small cost with deadly effect, and spectacular results have been achieved in the control of the cricket pest.

If a concerted effort is made by all farmers in badly-infested districts in the future, it appears probable that the cricket problem need never again reach its devastating proportions of last season on the Hauraki Plains.

BRITISH AGRICULTURAL BULLETIN

In the review of the British Agricultural Bulletin on page 351 of the October issue of the "Journal" the price of the publication was given as 5s. This should have read 15s.

CARE OF LIVESTOCK DURING JANUARY

Contributed by the Animal Research Division.

LAMB WEANING

WEANING is an important event in the life of a lamb and special care at this time will be well repaid. Long-wool lambs should be shorn and all others crutched. Weaning is the most important time for drenching against worms and this is especially necessary in wet summers. A full dose of 20 grammes of phenothiazine should be given. If fattening crops are not available, lambs should be drafted into clean paddocks after drenching. For this purpose hay or silage aftermath is excellent. Lambs should never be weaned into paddocks in which ewes and lambs have been grazed during the previous month.

* * *

CULLING OF EWES

After weaning, the ewes should be gone through carefully with a view to selecting those which require culling. Teeth, feet, and wool should be examined carefully. Special attention should be paid to udders and teats, and ewes should be culled if they have defective udders or very large or damaged teats. The lambs of such ewes often die from starvation before they are a week old. Condition is a poor guide for culling, as ewes which have not reared a lamb are always in the best condition.

* * *

"PINK EYE" IN SHEEP

"Pink eye" is a very infectious disease which causes blindness in sheep. Care should be taken to prevent introduction of affected sheep into a clean flock. Once sheep in a flock are affected it is usually best to leave them alone, as they will recover in about a fortnight without treatment. Some sheep, however, may become completely blind, and if possible these should be caught and carted to a small paddock where they have ready access to water. It is best not to drive affected mobs to the yards, as the blind sheep are liable to injure themselves and driving tends to spread the disease. Any reliable eye lotion may be used for treatment, and this is most easily administered from a clean oil-can.

* * *

ST. JOHN'S WORT MAKES DIPPING DANGEROUS

Sheep that eat St. John's wort become sensitive to sunlight and scabs develop on the ears, face, and back. If sheep in such condition are dipped they take convulsions and may be drowned. If possible sheep should be grazed on country free from St. John's wort for several weeks before dipping. If this is not possible, dipping should be done only on dull days.

LAMB-FATTENING FODDERS

Rape should not be grazed until the leaves show a purplish tinge. "Unripe" rape does not fatten so quickly and seems to "scald" more readily. Best results are probably obtained by grazing in breaks which last the lambs about a week. It is false economy to keep lambs on a break until the last leaf is eaten; they should be moved on while they are still getting a full feed. The paddock can be cleaned up with ewes. Run-offs have little to recommend them and unless they contain good pasture they will depress the lambs' rate of growth. If hay is fed, it must be of the very best quality. Thousand-headed kale is splendid lamb-fattening fodder, but must be managed properly. It should always be fed in breaks and grazed only lightly before lambs are moved on to the next break. Treated in this way the kale makes excellent regrowth and can be regrazed several times, and if necessary the grazing can be extended into the autumn and winter.

* * *

RYEGRASS STAGGERS

Sheep, cattle, and horses in some districts become affected with a disease which causes them to stagger and fall when driven. If left alone they recover, but the trouble recurs if they are again moved. The cause is at present unknown, but stock will frequently recover if moved very quietly to a paddock containing green feed. If this is not available, they should be disturbed as little as possible.

* * *

ERGOTISED GRASS MAKES DANGEROUS HAY

Lameness and even loss of feet may occur when cattle are fed on hay heavily infested with ergot. The black ergots replace the seeds of ryegrass and other grasses. Where this is known to occur hay should be made before the ergots have time to form.

THE REQUEENING OF DOMESTIC HIVES OF BEES

By L. H. JOHNSON, Apiary Instructor,
Department of Agriculture, Palmerston North.

THE maintenance of the youthful vigour of a colony by requeening with a young queen every year is a very important part of colony management. The system of requeening of hives illustrated and described in this article is likely to be of more assistance to the 5750-odd beekeepers in New Zealand who own from 1 to 10 hives than it is to the commercial apiarist.

IT is desirable that the adjustment to the hive which requeening involves should be under some measure of control rather than that the bees should be allowed to raise queen cells either to swarm or to replace a failing queen. The mating of queens is not under the beekeeper's control, but if more attention were paid to the raising of an abundance of drones from one of the best queens in the apiary, better matings would be the result.

When to Requeen

Bees will build better queen cells from early October to mid-January than at any other time of the year, because that is the natural swarming season. It is desirable that queens should be reared, mated, and laying as soon as possible in this period. Although there are greater risks of losses with early queens through adverse weather conditions, the reward for it is greater.

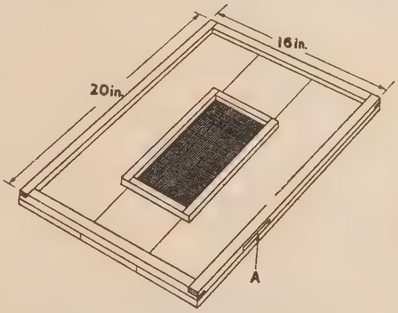
To destroy a laying queen and get another accepted by the bees means a certain amount of risk, especially to the beekeeper who has only one hive. It is possible after having destroyed the old queen and being unsuccessful with the introduction of the new one to end up with a queenless stock of bees.

Raising Queen from Parent Colony

If the colony is headed by a vigorous, pure Italian queen, it is not necessary for the beekeeper to obtain a young queen from another source. While the queen is prolific and the bees pure it is sound practice to raise a queen from the existing stock and requeen the hive annually. (Pure Italian bees are characterised by three yellow bands on the body.)

Queen and brood placed above the division board.

The bees should fill a two-storeyed hive before they are strong enough for queen rearing. If the colony is below strength, it is advisable to feed the bees with sugar syrup in the proportion of two parts of sugar to one of water. The division-board feeder and the inverted tin are the most popular types used. The syrup should stimulate brood rearing and quickly boost the colony up to strength. Building up of the colony is often greatly retarded by the hive being located in a shady or draughty position. Not only should the hive be in a suitable situation, but the entrance should face away from the prevailing wind.



Division board with double wire gauze screen in centre. A—Entrance 3in. x ¼in.

The Division Board

When the colony is at the desirable strength the next job is to make a division board. A framework measuring 20in. x 16in. and ½in. thick (see diagram above) can be made of timber with a space in the centre to be covered on each side with wire gauze. It is important to use a double screen ½in. apart so that the bees cannot make direct contact with one another. This ventilated space is to allow the warmth of the bees below to rise and so prevent chilling of the brood on top. A margin strip of timber ⅞in. wide by ½in. thick should be fixed to the outer edge of the division board. A check approximately 3in. x ¼in. should be taken out of this margin strip on one side near the front as illustrated to provide an entrance for the bees. Another type of division board can be made by using a piece of tin cut to the same dimensions and fixing a margin strip to the outside.

Bees in the top storey beginning to use the entrance after 3 days.

Hive Manipulation

The next operation is to find the queen. By placing the hive cover on the ground and lifting off the top storey on to it each super can be examined separately. When the queen is found she should be secured by placing a push-on cage over her to prevent her from becoming lost or injured during the adjustment of combs. A simple way to make this cage is to cut the top out of the lid of a boot polish tin and solder on a piece of wire gauze, also soldering four 1¼in. nails to the sides of the lid (see diagram on next page). These projections will push into the comb and hold the cage in position. Select a comb, preferably a fairly new one, with larvae which have just hatched. The comb is now prepared by cutting off a piece of the surface of it with a sharp knife to reduce the cells with young larvae to about ⅛in. deep. This will give room for the bees to build queen cells. The prepared comb should now be placed in the centre of the box set on the floor-board (referred to as the bottom box). Combs should now be adjusted by leaving two more frames of sealed brood, the remainder of combs of honey and pollen, also a feeder of syrup in the bottom box with the prepared frame. A drawing pin fixed to the top bar will make a suitable marker for this frame.

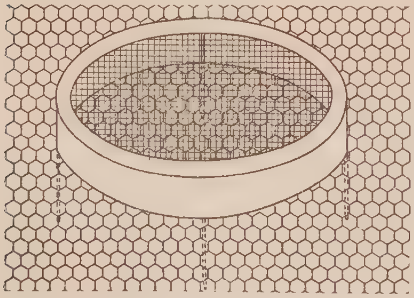
The division board can now be placed on this bottom box and the top super placed on it. Provision should also be made for the food supply for the top storey. Combs of honey or dry sugar put on the division board will be satisfactory. The caged queen should now be released in the top storey and the hive closed up. This operation should be carried out during the forenoon on a fine day to give the bees time to sort themselves out before night, when the flying bees will have returned to the original entrance.

REQUEENING OF DOMESTIC BEEHIVES . . .

Cell building will usually be commenced by the queenless section of the colony in 2 or 3 hours. After 10 days the division board together with the top super should be lifted off the hive and the prepared comb carefully lifted out. The largest queen cell should be left and all the remaining ones which may be found on this or on the other two frames should be destroyed. Failure to do this may result in a swarm issuing with several virgin queens. If there are no combs of honey, the feeder should be filled with sugar syrup again and the hive closed and left for another 16 days. The hive should then be examined to see that the queen has commenced egg laying. The food supply and super room of the colony above and below the division board must be watched until the main honey flow.

About December 1, which in the Manawatu would be approximately 2 weeks before the main honey flow, the old queen on top should be killed. The two colonies can now be united by removing the division board and putting in its place a sheet of paper. It is also a good plan to place a queen excluder in with the sheet of paper. The supers above the excluder should be examined in 10 days, and if any queen cells are built, they should be destroyed.

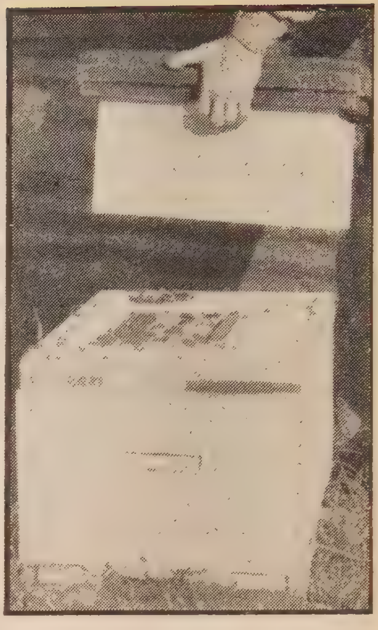
This system is suitable for one hive, but will also meet the needs of a 10-hive apiary. The hive manipulation up to the point where cells are ripe is the same in the larger apiary, with the exception that the day after the cells have been commenced they should be examined and where two queen cells have been started close together the larva should be removed from one of them. This will allow queen cells to be built somewhat spaced out. Instead of now destroying the surplus queen cells as for requeening a single hive, they can be kept and used for requeening the remainder of the colonies in the apiary. This job can be proceeded with in the same manner as previously described; that is, the queens and most of the brood with adhering bees are placed above the division boards of each hive. Queen cells are then carefully cut out of the comb and are placed in West cell protectors, each one of which is fastened between two frames of brood in the bottom boxes. During the warm, settled weather of summer it is not usual to protect the cells. In all of these operations the colonies should have an adequate supply of honey or be fed with sugar. If this is not attended to, the bees may not accept the virgin queen. If the young queen is lost at mating time, another frame of brood should be inserted in the centre of the bottom box and the process started over again. The old queen in the meantime will continue to build up the colony strength in the top super.


A queen-holding cage which is placed over the queen and the projections pushed into the comb.

The advantages of using the division board are many. The original queen is retained until the new one is well established, there is no serious risk of brood becoming chilled through adverse weather conditions, and swarming is practically eliminated. No extra equipment is required other than the division board.

Autumn Queen Rearing

Queen rearing is usually carried out in spring and autumn, but colonies should not be disturbed during the main honey flow. To raise autumn queens it is usually necessary to feed the colony artificially a few days before commencing hive manipulation. If this is not done, very small queen cells will be the result. Good queen cells can be raised by the bees in one hive below the division board, as previously explained, but for the remainder of the hives the former system could now be reversed. The queen and most of the brood are left in the bottom box. Four frames of brood and six combs of honey with adhering bees are placed in a super above the division board of each hive. A ripe queen cell is then given to each nucleus so formed. As robbing is often troublesome at this time of the year, it is advisable to close the entrance to the top storey for 3 days, after which the bees in the nucleus hive will have settled down and be ready to defend themselves. Extra queens kept above a strong colony can be carried over winter and are valuable for early replacements in spring. It is usually found that these autumn-hatched queens build up the colony rapidly in the early part of the season.


Feeding the bees with dry sugar placed on the division board.

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Vaccination Against Contagious Abortion

APPLICATIONS by farmers for vaccination of their calves against contagious abortion in 1949 are now due. The charge is 1s. 6d. per calf for the first 14 calves in any herd and 1s. 3d. per calf thereafter. The closing date for applications is January 14 and a late fee of 10s. is payable on all applications received after this date.

As in previous years members of veterinary clubs should apply to the secretary of their club and other farmers should apply to their nearest Inspector of Stock, from whom they can obtain the necessary application forms. Applications to Inspectors of Stock must be accompanied by a cash payment calculated on the basis of the charges mentioned above.

It is desirable that applications be sent in as early as possible so that vaccinating officers can arrange the work efficiently. Farmers are therefore requested to forward their applications by December 31.

Deaths of Lambs Grazed on Linen Flax Fibre

THE danger of allowing lambs to graze on linen flax straw was shown recently by a case of considerable mortality in a line of about 1000 lambs. The lambs were run on rape and had access to an area which carried linen flax fibre after header harvesting and a similar area of threshed pea straw. Deaths among the lambs occurred about 8 days after they went on to the block and they were then moved to pasture and the fibre ploughed in. Lambs continued to die up to nearly 3 weeks after they were removed from the fibre, almost 100 lambs being lost.

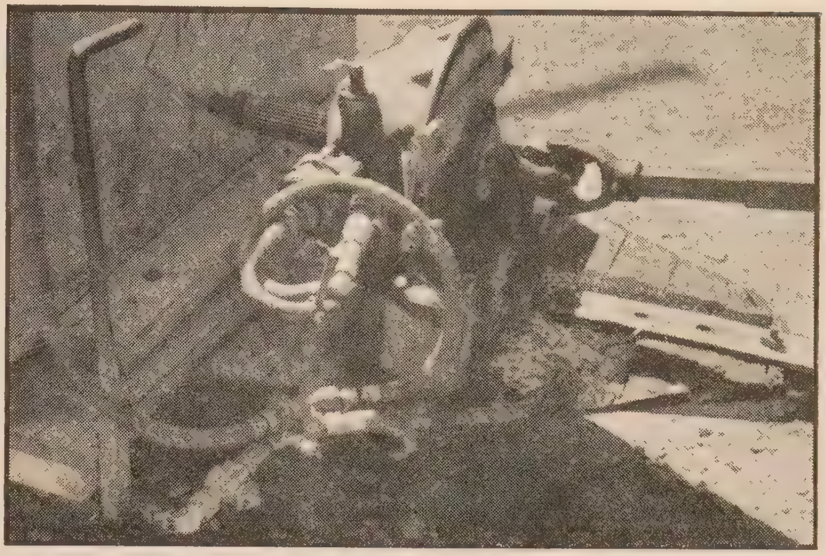
Post-mortem examinations revealed the paunch or first stomach packed with a mass of the linen flax fibre, and deaths were apparently caused by a form of starvation through the inability of the animal to take in other food material, as the fibre would resist digestion for a long period. Treatment was not attempted, because nothing less than a surgical operation for the removal of the mass could have been of benefit. As the fibre was apparently attractive to the lambs, a similar result might be possible with older sheep or even with cattle.

—Livestock Division.

◆

High-volume Sprayer for Hormone Weedkillers

THE increasing number of farmers taking advantage of methods of suppressing weeds by chemical and hormone sprays will be interested in a sprayer made by Mr. T. L. Hayman on his farm at Studholme, South Canterbury. This machine is a high-volume, high-pressure sprayer and must not be confused with the low-volume, low-pressure machines being developed for similar purposes. It is described in this article by W. A. R. Miller, Department of Agriculture, Waimate.



The pump with power take-off attached.

WITH the realisation that hormone weedkillers are as effective at high concentrations as they are in normal spraying dilutions, attention has been drawn to the possibility of low-volume spraying, using fine nozzles which spray at rates as low as 1 gallon per hour for each nozzle. These low-volume outfits have many advantages over high-volume machines. As they work at low pressures, they are simple and cheap to construct, and the greatly-reduced volume of liquid required obviates the necessity for special trailers. The lightened load reduces crop damage and permits faster spraying.

Nevertheless, some circumstances appear to call for high-volume spray applications—that is, rates of the order of 50 to 200 gallons per acre. Some materials which are in suspension rather than solution will not pass through the fine nozzles of a low-pressure sprayer, and other substances normally applied in solution require considerable amounts of water to dissolve sufficient to give effective applications. For materials such as these the sprayer described has particular merit.

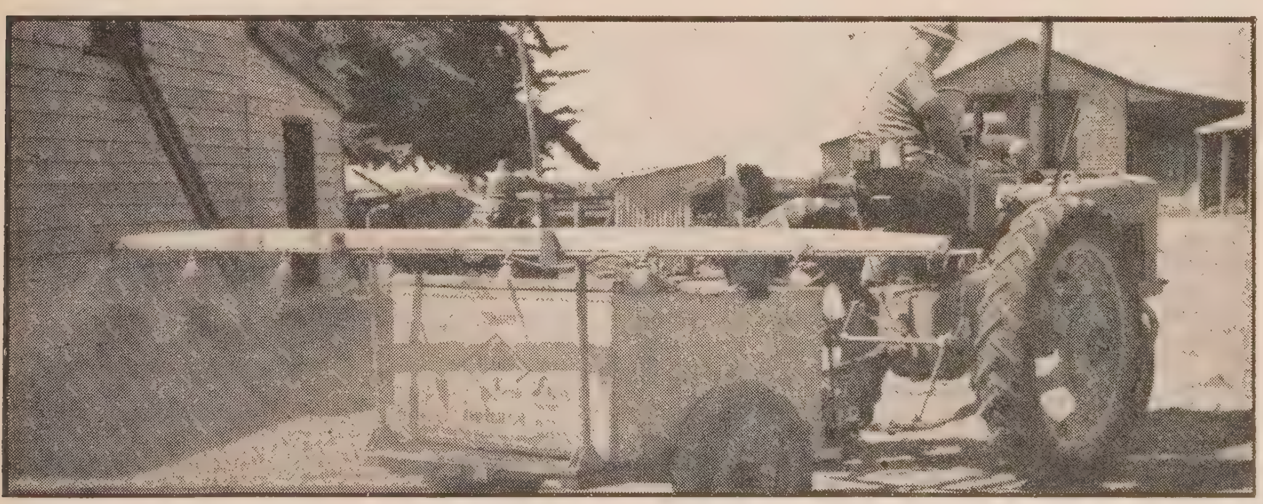
The machine operates from a 200-gallon galvanised tank on a trailer 5ft. long by 4ft. wide, with 16in. pneumatic tyres and a clearance of 1ft.

The pump which provides the pressure, originally the oil pump on a Cheetah X aircraft engine, is mounted on the front of the trailer and driven by a tractor power take-off. It is of the rotary gear type with an 8:1 ratio. The intake for the pump is at the bottom and to the front of the tank, where an aircraft oil filter has been fitted to prevent sediment and foreign material reaching the pump.

The liquid spray is led through reinforced rubber hosing from the pump to a 15ft. boom at the rear of the trailer. Along the boom are 8 Bordeaux spray taps equal distances apart. Between the pump and the taps is a pressure gauge and a by-pass in case of blockages. The pressure is kept at 100lb. per sq. in., and the height of the boom for maximum spread without waste is 4ft. Bordeaux taps are used because they give a fine curtain spray instead of the cone spray of some types of nozzles.

For passing through gates the boom is clipped in position lengthwise; it can be taken off and put on in a matter of moments. For spraying along fences and ditches a hand spray is used, consisting of 2 taps 2ft. 6in. apart and a length of rubber hosing.

This machine has given satisfactory results. At a tractor speed of 2½ miles per hour it will spray 100 gallons on 1 acre in half an hour.



The sprayer with the boom in position for maximum spread without waste.

PREVENTION OF WORMS IN LAMBS AND HOGGETS

By L. K. WHITTEN, Parasitologist, Department of Agriculture Animal Research Station, Wallaceville.

WORM parasites are invariably present in grazing sheep. Under good conditions of sheep husbandry their numbers remain low and they cause little or no harm. Under some circumstances, however, when their numbers increase beyond a certain level symptoms of disease will appear and in bad cases death may follow. Loss of condition or retarded growth occurs in non-fatal cases. Frequently losses from this cause may be occurring without the farmer being aware of it.

IN New Zealand, though serious parasitic disease is sometimes seen in ewes and in unweaned lambs, it is principally a disease of weaned lambs and hoggets over the late summer and autumn and winter. Milk lambs are usually drafted into the freezing works before their infestations have built up to dangerous levels. Parasites are therefore mainly a problem of breeding flocks, and within such flocks it involves the young sheep during their first year of life.

Life Cycles

Worm parasites live in the sheep's stomach or gut and their eggs reach the pasture in the dung. Warm, moist conditions are essential for development to proceed to the infective stage. This stage is an active one, and by migrating to the grass blades, the parasites become available to the grazing sheep. After being swallowed they reach maturity within the host in about 3 weeks.

Effect of Climatic Conditions

In times of drought or in colder weather development of free-living stages is arrested and only relatively-few worm larvae are acquired under such conditions. The environment of the adult parasite, however, is a relatively constant one, and over periods when weather conditions are unfavourable for the free-living stages the adult parasites within the sheep survive. It is from this reservoir that pastures become contaminated as soon as favourable weather conditions return.

It is well known that parasites are most troublesome during years in which the late spring and summer are unusually wet. November and December are critical months and continued wet weather over this period will allow wholesale development of infective larvae. At this time also lambs grazing the pasture are old enough to be eating considerable quantities of grass, but have not yet developed an immunity to the parasites. The check they suffer at weaning time tends to render them still further susceptible to the parasite.

Clean Feed Most Important at Weaning

If possible, in view of the susceptibility of the weaned lambs, clean feed should be made available for them after weaning. Worm larvae have a limited life span on ungrazed paddocks and for this reason new grass, aftermath, spelled paddocks, or fattening crops such as rape or lupins are relatively clean. Complete sterilisation of a paddock by the passage of time takes many months, but very appreciable reductions in larval populations can take place in as little as 3 weeks, especially in dry weather.

Though fattening crops of rape and lupins are generally very clean, serious reinfestation may take place in wet seasons. This will occur from a pasture run-off or from grass or clover undercover, especially if the grazing period has been protracted and the stock concentration heavy, as is usual in a good season.

In dry summers when larval development is checked normal pasture is usually sufficiently clean for little trouble to be experienced, but when the rain comes in the autumn the danger reappears, particularly in years when drought conditions have been extreme and weaned lambs therefore have been seriously under-nourished. Under such conditions animals which are debilitated through semi-starvation fall easy prey to worm infestation and acute outbreaks may occur.

Outbreaks of this type are often serious because, not only may the death-rate be high, but survivors must be wintered with little or no body reserves to carry them over the critical winter months. Over-wintering losses among such hoggets may be considerable in spite of repeated drenching, careful nursing, and special feeding. Even though the parasites are removed, the disease may have progressed so far that the hoggets fail to respond. The situation may improve only when spring pasture growth becomes well established.

Treatment

Drenching sheep is a costly procedure both in drugs and labour, and at the present time very large quantities of drugs are wasted in indiscriminate drenching. Many sheep are drenched that do not require it and very often any improvement in body weight which does follow drenching is insufficient to meet the cost of the treatment. On the other hand many sheep that require drenching urgently are drenched inefficiently or not at all. The worm drenches that are available for treating infected sheep must be used intelligently if the full benefit is to be derived from them.

Phenothiazine is by far the most effective drug available, but it is also the most costly. Bluestone-nicotine sulphate mixture and tetrachlorethylene are the only other materials that might be considered for wormy lambs and hoggets. They are cheaper than phenothiazine but less effective.

In districts where worms are troublesome, treatment at weaning time is recommended. In a normal dry summer it is extremely doubtful whether any further treatment is required until 3 weeks after the first autumn rain. In an abnormal wet summer, however, repeated treatment at 3-weekly intervals may be necessary.

If possible, young sheep should be moved after drenching to spelled paddocks or paddocks which recently have carried only adult sheep or cattle.

A high plane of nutrition should be maintained by the use of saved pasture, special crops, or high-quality legume hay. The response to drenching will be disappointing when worm infection is complicated by other factors, such as cobalt deficiency or general malnutrition from a deficiency in quantity or quality of the feed.

In many instances it is advisable to draft off the most backward sheep of the flock so that they can be given special feed and drenching treatment. There is always a risk, however, that a small hospital paddock may become grossly contaminated and be a source of further heavy infestation. This can be avoided, however, by drenching and rotational grazing.

Experience has shown that unthrifty hoggets make a good recovery when grazed on dairy pastures. Pasture 3in. to 4in. high, though usually considered too long for good sheep feed, does tend to give better results than shorter growth when grazed by hoggets in the autumn.

Prevention

Prevention should aim at the protection of the young sheep. The practice of rotational grazing tends to reduce the number of worm larvae picked up by the animal. Ideally, sheep should be moved after grazing a paddock for a week. The spelled paddocks should be ungrazed for as long as possible compatible with efficient pasture management. Young sheep should not graze pastures too short, and where hard grazing is necessary older sheep should follow the younger ones for this purpose.

On properties where both hill pastures and flats are available and where experience has shown that young sheep fail to thrive on the flats, they should be confined to the hills and the flats should then be grazed by older sheep and cattle.

The importance of nutrition in prevention cannot be over-emphasised, because not only does a sheep on a high plane of nutrition suffer less from a moderate infestation, but such an infestation is thrown off more quickly. Furthermore a smaller number of larvae will reach maturity in a well-fed host than in one which is underfed.

The Harvesting of Cereal Crops

By C. P. WHATMAN, Instructor in Agriculture, Department of Agriculture, Timaru.

THE change in harvesting methods in recent years, with greatly-increased use of the header harvester, has caused the revision of many ideas about the harvesting of cereal crops. In the days of the binder, rules about the time to cut and length of time in the stook and in the stack were fairly definite. Carefully followed, those rules ensured grain of the best possible quality and the minimum loss in harvesting. Those rules no longer apply, but certain recommendations for the use of the header harvester are required to take their place.

[Green and Hahn Ltd. photo.

The header harvester has revolutionised the harvesting of practically all cereal crops, reducing the labour required and speeding up the work.

WHEAT, New Zealand's most important cereal, is now almost entirely header harvested. Only in areas of mixed farming where the straw is an important by-product of the crop for such purposes as covering haystacks or potato pits, or for pig bedding, is the crop still tied and later threshed with the mill. Hunters wheat is almost confined to such areas, as it is unsuitable either for direct heading or for windrowing. With Dreadnought, windrowing is satisfactory. The headland is usually cut and stooked out of the way, the remainder being windrowed and picked up with the header. The other varieties, including Cross 7, Fife Tuscan, Solid Straw Tuscan, and Tainui, are suitable for direct heading and usually are treated so.

Barley and Oats

Until recently barley was considered to be a crop unsuited for direct heading, but during wet years when much barley was badly lodged direct heading was found to be the only practicable method of handling the crop in many cases. It is certain that little barley will be stooked in future. It may be either windrowed or direct headed, though the latter method is proving the more popular.

The oat crop has been the last stronghold of the reaper and binder, though there, too, it is fast losing ground. Oats can be successfully windrowed, but direct heading is risky, and there is need for the introduction of a heading oat. How it will compare with standard varieties in yield, quality of grain, and resistance to wind damage is not yet certain, though experience so far has shown it to be promising.

Successful heading and the production of a satisfactory sample depend almost entirely on the moisture content of the grain. The testing service of the Wheat Research Institute is available to the farmer to assist him in estimating the fitness of the crop. The aim in heading is the complete threshing of the grain without breaking or chipping, and the header should be set to approach that ideal as closely as possible. Chipping of the grain is particularly harmful in the threshing of barley for malting, in which a high germination percentage is essential, or in any cereal which is to be used for seed.

Chipping is most likely to occur when the grain is out of condition and consequently has to be threshed "hard." Fit grain threshes easily. Drum speed should be reduced and distance between drum and concave increased as much as is consistent with complete threshing.

[Green and Hahn Ltd. photo.

The English mill, traction engine, water cart, and the large number of men required to work them are now but a memory in most districts.

Conditioning Grain

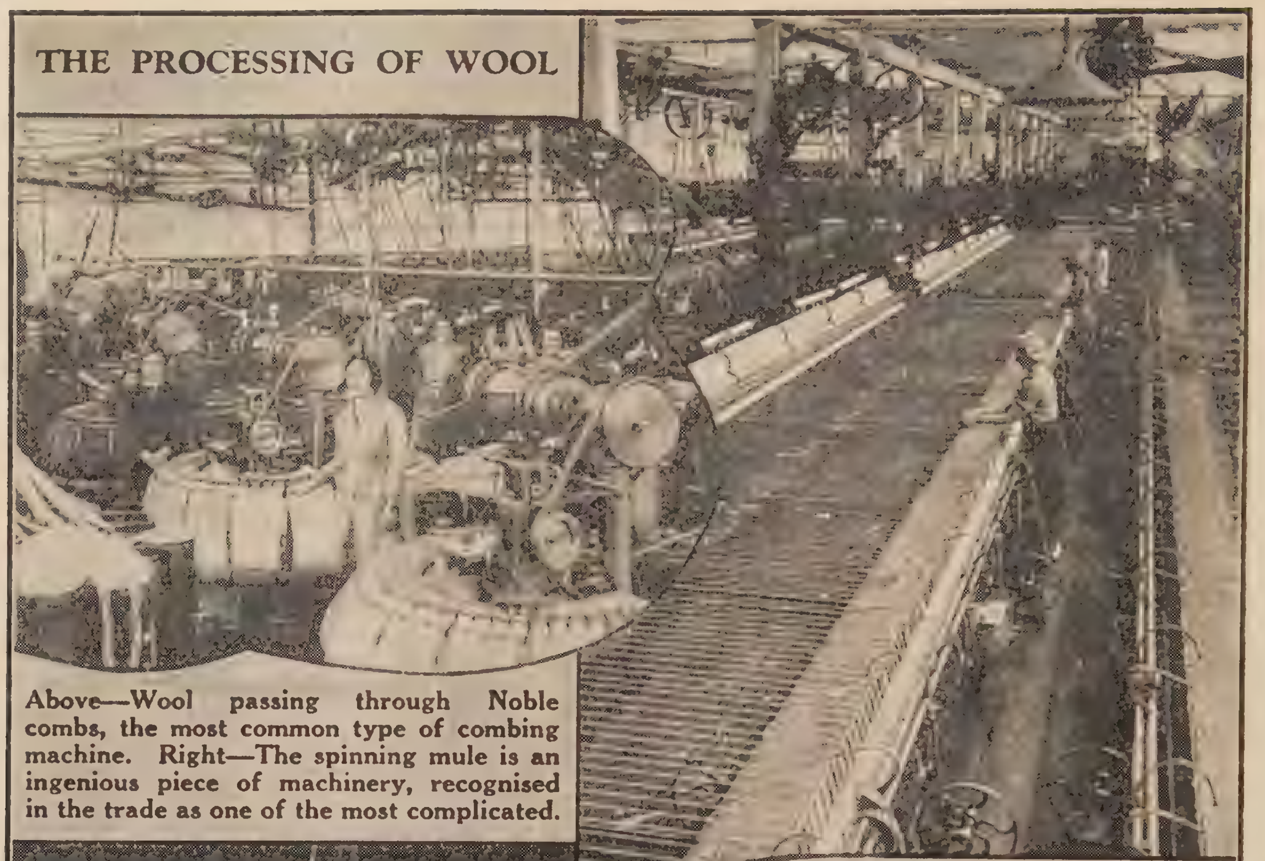
Though moisture content may be low enough for successful heading, frequently it may be still too high for bulk stacking in grain stores or for milling. Conditioning the grain in the sack is then necessary, a process to some extent comparable with the slow maturing that used to occur in a stack. This conditioning is usually carried out in the paddock by standing the sacks ears downward on the ground. A sack of grain in this position will turn a lot of water, but such a proceeding is risky and is unsatisfactory unless the ground is very dry. If sacks must be turned daily in the paddock, the harvest becomes laborious and most of the advantage of the header in reducing the cost of the harvest is lost.

These facts suggest that the use of the header requires, as part of the farmer's equipment for handling his crop, suitable shed room for conditioning grain. A well-ventilated shed, with a platform at lorry height floored with smooth battens on which a sack barrow can be used, offers the most convenient means of carrying out this conditioning. New sheds being built should be designed to provide something of this kind. Less convenient but quite satisfactory use can be made of sheep battens where special facilities are not available.

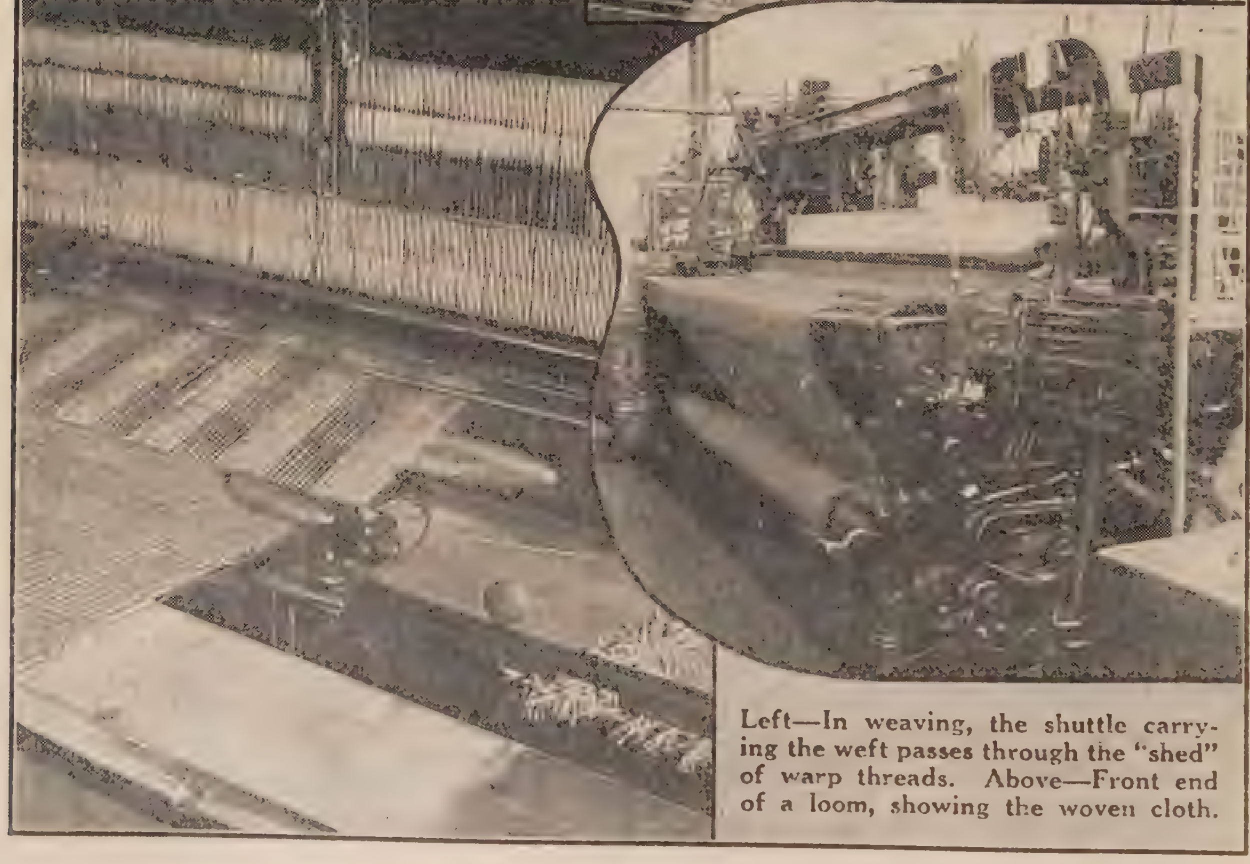
Grain will not condition standing on a concrete floor, and space for ventilation must be left between rows of sacks even when they are on battens.

The growing of cereal crops now depends on their suitability for harvesting with the header. That is recognised by the plant breeder, whose new varieties will be produced with this factor in mind. There is no reason why the header should harvest an inferior product if the farmer realises the machine's capabilities and limitations and uses care in the treatment of the grain after it is in the bag.

THE PROCESSING OF WOOL



Above—Wool passing through Noble combs, the most common type of combing machine. Right—The spinning mule is an ingenious piece of machinery, recognised in the trade as one of the most complicated.



Left—In weaving, the shuttle carrying the weft passes through the "shed" of warp threads. Above—Front end of a loom, showing the woven cloth.

[*Photographs: Top right, National Publicity Studios; bottom left, Sparrow Industrial Pictures Ltd*

The Processing of Greasy Wool to Finished Cloth

WOOL producers of New Zealand have a proud record of achievement during the past 100 years, and since first settlement have contributed more to the revenue of the country than has any other body of men engaged in primary production. The wool they have produced has gone to England, to Continental countries, and to America, and has been used to clothe peoples of all nationalities. It has helped considerably in developing trade within the Empire, in that England, always the Dominion's best customer, has sold back to her goods manufactured from her own wools. Yet surprisingly little is known of the many and varied processes which go into the building up of that wool into the cloth and garments which are bought over the world's counters every day, and the public and the wool producers themselves have very little knowledge of what happens to the wool from the time it is bought until it appears on the counters as finished products.

[National Publicity Studios photo.

THE woollen textile industry is so huge and has so many ramifications that more than a fair-sized book would be needed to cover the subject completely. Therefore this article by H. R. Lusk, Sheep and Wool Instructor, Department of Agriculture, Wellington, explains briefly and simply some of the more important processes and describes the operation of a typical New Zealand woollen mill.

Two Yarn-production Systems

The woollen industry is divided into two distinct systems for the production of yarn and, subsequently, the finished product. These systems are the woollen and the worsted.

The woollen system in general uses the cheaper raw materials, puts them through only a few processes, and produces a relatively low-priced product; the worsted system generally uses the better, higher-priced types of wool and puts them through many processes to give the best of styles and finish to a quality product of a fairly-high price. New Zealand mills, unlike the English, sometimes incorporate both woollen and worsted sections under one roof and turn out a complete range of woollen and worsted products, including made-up garments and knitwear.

The diagram on the next page illustrates the order of processes in the different systems of manufacture. The processes in the woollen system from raw wool to finished product are far fewer than in the worsted system, so the woollen section of a mill, up to the stage where the wool is converted into yarn, will be dealt with first.

Wool sorters at work.

The Woollen System

In the woollen section raw wool is converted into a yarn with long fibres forming the inner core and short fibres pointing in all directions. These fibres are thoroughly mixed, giving a loosely-spun, fuzzy, and slightly-irregular yarn.

Sorting

The first process in either the woollen or the worsted system is sorting. No two fleeces are exactly similar, even when taken from the same type of sheep and from the same district, and the more thorough and intensive the sorting the better the product will be.

Wool sorters are highly-skilled craftsmen capable of judging the average diameter of wool fibres to within a 1/10,000in. The object of sorting is the classifying of the staples of the fleece according to their length, fineness, soundness, and colour, and the requirements of the woollen and worsted systems are taken into account at this stage. Fineness is recognised by the sorter in terms of the spinning ability of the wool usually expressed in the Bradford count system. Originally "count" meant the number of hanks of yarn, each 560yds. long, which could be spun from 1lb. of "top," and though sorting is still based on this count system, in practice wools are very rarely spun to their maximum count, so that count has come more and more to be recognised as relating merely to the fibre diameter of a wool and not to its spinning ability. The finer the fibres, the more hanks which can be spun from 1lb. Length plays a big part in determining whether the wool can be used on the woollen or the worsted system, and wools which are too short for the worsted system must be taken out at this stage.

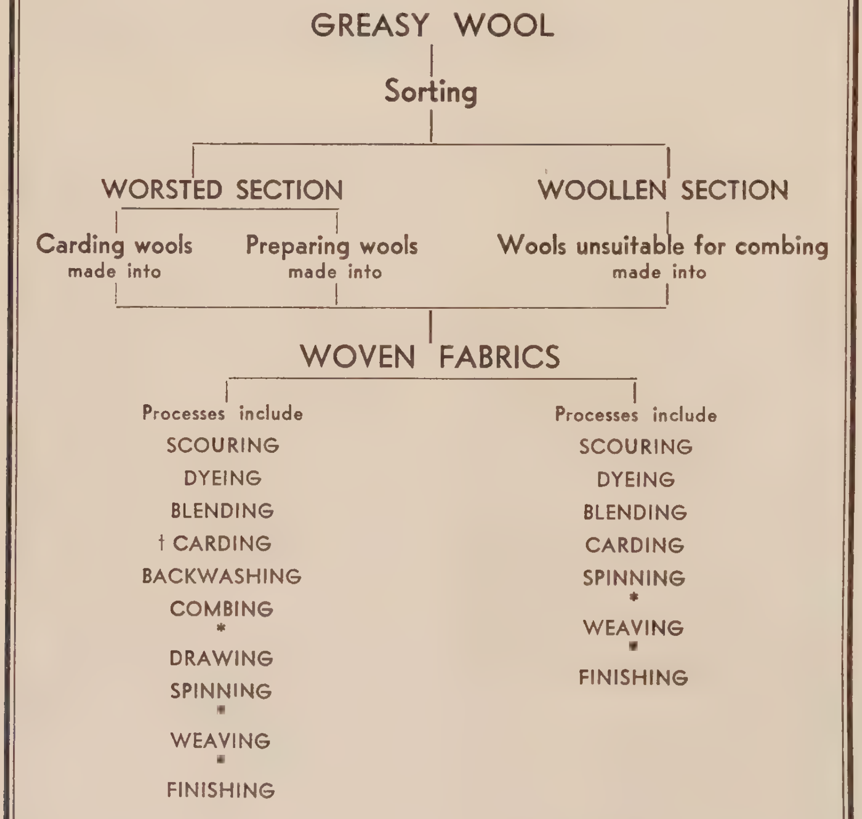
Wool which has been classified and broken up according to its manufacturing characteristics is then taken from the sorters' tables and stacked in bins. These bins may hold wool of the same characteristics taken from a number of sorters' tables, and the wool is mixed and blended in the bins to form what is known as matchings.

Scouring

As sorting wool in its scoured state is extremely difficult, if not in some cases impossible, wool is seldom washed until after it has been sorted. Wool is washed, or scoured, to remove the wool grease and sweat, or yolk, and other impurities which a sheep has or acquires in its fleece from shearing to shearing.

Wool-scouring machines are of quite a number of different types, but in the main the principle is the same. The machinery consists of a number of long tanks or bowls filled with water at varying temperatures to which soap and an alkali have been added, and the wool is propelled slowly and gently through these bowls by mechanical rakes. The alkali is used to help the soap to loosen or emulsify the waxy yolk which coats all wool fibres and protects them when growing on the sheep. The wool is rinsed in cold clean water at the end of the scouring process and the surplus water removed, usually by hydro-extraction, which consists of whirling the wool very quickly in a circular, perforated bowl.

PROCESSES IN THE WOOLLEN AND WORSTED INDUSTRIES



† Preparing wools are processed in the same sequence as carding wools in the worsted industry except that gill boxes are used in place of carding machines.

* Dyeing can be done at any of these stages, depending on the type of cloth being made at the time.

The wool is dried in a mechanical drier and is then ready for the next step in processing. It can be dyed at this stage or at subsequent stages of manufacture, according to the requirements of the cloth being made.

Blending

The wool is usually blended at this stage, both for greater uniformity of fibre diameter and for the mixing of different-coloured wools to make up a yarn of a certain colour. A large, square stack of one material or colour is made on the floor, then a layer of the second element in the mixture is spread over the first and so on. This mixture is then fed into a willey or fearnought machine, being oiled as it passes over the feed sheet to facilitate the movement of the fibres sliding over one another and to prevent breakages. The willey machine mixes the wool thoroughly and fluffs it up preparatory to the next stage of processing.

Carding

The object of carding is the thorough opening of the wool, fibre from fibre, the mixing of all wools, and the subsequent production of "slubbings" of uniform quality and colour.

The carding machine is massive and may consist of two or three sections. It is composed of a series of cylinders and rollers, the surfaces of which are covered with small, bent, steel wires or teeth which are called card clothing. The action of carding depends on the direction of rotation of the rollers, the direction in which the teeth point, and the surface speeds of the rollers which work together. The last part of the carding machine is fitted with a condenser, which converts the wool into slivers, which are run on to bobbins ready for transfer to the spinning mules. These woollen slivers, or slubbings, are soft and twistless, but have just sufficient strength to permit of their being spun.

Mule Spinning

The woollen mule is a most ingenious piece of machinery and is recognised in the trade as one of the most complicated. The movements of the mule are too numerous to detail, but their object is to draw out the slubbings, put twist into them, and finally wind the yarn back on to "cops" for the next step in manufacture.

At this stage the woollen yarn is ready to go forward to the cloth-weaving sections of the mill.

The Worsted System

The spun material produced by the worsted system of yarn manufacture differs greatly from a woollen yarn. All the short fibres have been removed and the longer fibres are arranged parallel, giving a strong, smooth yarn suitable for a great variety of the better type of suiting and dress materials.

Preparing and Carding

Wools to be treated in the worsted section of the mill follow the same course as in the woollen section up to and including blending, but the treatment differs greatly from then on. In

Wool being scoured and dried.

other countries most wools over a certain length are usually put through preparing gill boxes before going on to the combs, but in New Zealand, as far as is known, all worsted wools are treated on the worsted carding machines, there being no preparers.

The worsted carding machine is similar in action to the woollen one, but at the end of the machine the wool is condensed into a continuous end or sliver of regular weight and thickness.

Backwashing

Though the wool is cleaned thoroughly in the initial scouring, subsequent processing gives it a somewhat dirty appearance, and in the carding machine the teasing out of the fibres reveals dust and dirt picked up en route. This must be removed before the wool goes any further, so the sliver is put through the backwashing machine, which washes it gently, dries it, re-oils it, and delivers it at the other end ready for combing.

Combing

Up to this stage both short and long fibres are present in the sliver, but combing separates the short fibres from the long and lays the long fibres parallel. The short fibres, known as noils, are transferred back to the woollen section of the mill to be made up into woollen yarn or to be blended for the hat trade. The most common type of combing machine is the Noble, though there are others, one of which, used on the Continent, can comb wool of a much shorter fibre.

The products of several combs are put through gill boxes, which mix the slivers thoroughly, continue the straightening process, and then condense them into the finished product, which is known as a top.

Drawing

At this stage the top is fairly thick, and numerous drawing operations are introduced to reduce the thickness to a point at which spinning can be started. As many as eight drawing machines may be used for converting the top into roving, a thread of a suitable thickness for spinning into yarn.

Spinning

After the roving has been produced from the last drawing operation, yarn is produced by the spinning frame. Yarns can be produced by three different systems of spinning, each of which spins a yarn embodying some feature not possessed by the others. In general, however, the principle is the same and the yarn is produced to a count number, based on the number of hanks of 560yds. required to weigh 1lb.

The yarn is drawn through two pairs of rollers, the front pair of which revolve slightly faster, with the result that the yarn is drawn out un- It is then wound on to bobbins, twist til it has reached its maximum count. being inserted in the yarn at the same time. Twist has an important bearing on the ultimate use of the yarn, and imparts strength and "handle" to it. Two or more yarns may be twisted together for greater strength or to obtain marl effects from yarns of different colours.

Warping and Weaving

From this stage onward both woollen and worsted systems will be treated together, because from this point the weaving of the cloth and the finishing processes are very similar, though some worsted cloths undergo quite a number of additional finishing processes. Some New Zealand mills also have a knitting section, to which worsted yarns are sent to be made up into hosiery and knitwear garments. It would be impossible to deal with all the ramifications of the weaving and knitting sections of the industry, so a typical worsted yarn will be followed through its processes up to the finished cloth.

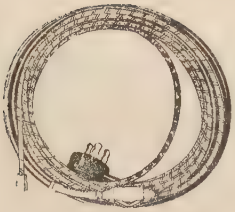
Warping

To prepare the worsted yarns for the weaving process two distinct types are necessary, the warp yarn and the weft. The warp thread is that which runs lengthways in a piece of cloth. Bobbins on which the warp threads have been wound are arranged on a rack, known as a creel, behind a huge wheel called the mill. The bobbins are placed on the creel in the proper order to form the pattern the warp threads will eventually make in the cloth. The threads from the creel are wound on to the mill in the correct sequence and are transferred from the mill to the weaver's beam, which is then placed in the loom preparatory to the weaving.

The weft threads are those which run crossways in the cloth. They have no special preparation before being woven apart from being wound on small bobbins to fit inside the shuttle.

Weaving

Before the warp beam is placed in the loom each warp end must be passed through healds, or eyes, which are set in frames. When the warp beam is in position at the back of the loom the heddle frames are so arranged that they can move up and down alternately, carrying the warp threads with them and thus forming a "shed" through which the weft yarn



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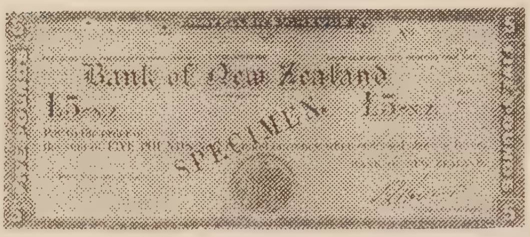

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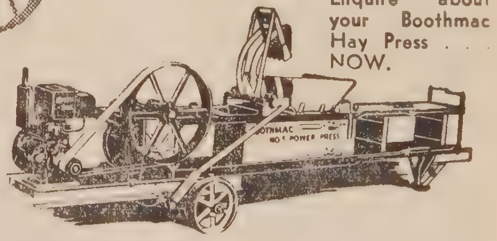

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Branches throughout N.Z. Head Office: P.O. Box 99, Christchurch is passed. The lifting of some threads, the exclusion of others, and the interlacing of the weft thread at each movement forms the pattern in the cloth. After each weft thread has been passed through the shed it is beaten up against the thread preceding it, forming a very firm texture in the cloth.

Finishing Processes

Weaving is by no means the end of the manufacturing process. Cloth which has just come off the loom looks more like sugar-bag material than anything else.

The cloth is subjected to an extraordinary number of finishing processes, all of which have the ultimate objective of making the cloth as even in texture and smooth in finish as possible. The appearance and "handle" required in the finished cloth control the processes and degree of treatments. In the main, however, the stages in finishing described are followed for a typical worsted suiting material.

Perching, Burling, and Mending

When a cloth leaves the loom it is carefully examined for imperfections and irregularities; this is known as perching. Should imperfections be found, they are marked and the length of cloth is sent to the burling and mending department, where all these faults are corrected. Such things as pieces of seed and burr which have gone through every process in manufacture without being noticed are picked out, and knots or broken ends in the cloth are mended.

Scouring, Milling, and Tentering

The cloth, which has picked up dirt and grease during its travels, is washed in a solution of soap and water and then passed to the milling or fulling machines. These machines shrink the cloth to the required width by the action of moisture, pressure, and heat, so that the wool fibres form a far denser texture.

The cloth is then fixed firmly on a conveyer belt, the edges of the cloth (selvedges) being gripped by hooks so that the correct width is maintained, and is passed through the tentering machine, which is composed of steam pipes between and over which the cloth travels. This dries the cloth and sets the width permanently.

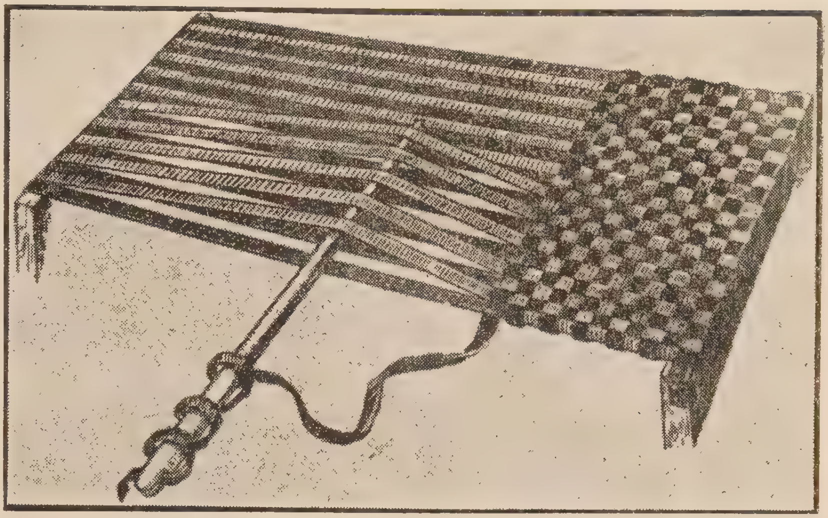
Steaming, Brushing, and Cropping

To make the cloth perfectly clean and level it is run over a machine incorporating a steam bath, which softens the fibres and removes wrinkles. Another machine raises the tips of the fibres by the action of stiff brushes on the face of the cloth.

A machine known as a cropper has a long and very sharp rotary blade like that on a lawn mower. It shears the tips of the fibres evenly from the face of the cloth and also removes any loose fibres picked up in the raising process.

Setting, Pressing, Cuttling, and Weighing

A final setting of the cloth is introduced by winding it on a perforated roller through which steam and cold air are forced alternately under high pressure. When this has been done and a final pressing has been given the piece of cloth, its travels are all but over. The cuttling machine folds the cloth, measures it, and winds it on to those familiar rolls seen on the shelves of tailors' and drapers' shops.



The principle of weaving.

Uses of New Zealand Wools

The character of woollen clothing depends entirely on the nature of the fibre. Long-fibred wools cannot be made up into the same type of material as can short-fibred wools, and coarse fabrics are structurally and fundamentally different from fine fabrics. Following are descriptions of New Zealand wools and the uses to which they are put:

Merino

Merino sheep grow the finest wool in the world, but they produce only about 2 per cent. of New Zealand's wool clip. Because of environmental and climatic conditions the Dominion's Merino wool cannot compete in fineness with some of the Australian Merino, which, in general, has ideal conditions for growth. However, New Zealand Merino wool is used in the manufacture of the best in underwear and lingerie, fine worsted suiting material, dress fabrics, rugs, the better-quality knitting wools and fine hosiery, and specialty materials such as fine billiard cloths and piano felts.

Corriedale and Half-bred

For fineness and softness Corriedale and half-bred wools cannot compete with Merino wools, but they are more durable and can imitate at a lower price most of the cloths made from finer wools, including flannels, rugs, and blankets.

Southdown and Down Cross

Southdown and Down cross wool, being the least likely to felt, is very adaptable to the knitting trade, because knitted articles such as hosiery, underclothing, and pullovers are subjected to much more washing than other woollen garments.

Lincoln

Lincoln wool is comparatively rare in New Zealand now, though at one time the Lincoln was a favoured breed for crossing with the Romney. The wool, being very strong, lustrous, and long, is used for linings, braids, carpets, filter press cloths in industry, and in general for all types of materials which must be durable and resist wear.

Crossbred

In the wool trade characteristics of fibre diameter override the importance of breed, so that all New Zealand wools other than Merino, half-bred, Corriedale, Southdown, and Lincoln are termed crossbred by the trade, though the wool may be, for instance, straight Romney type. Into the crossbred category, therefore, fall the Romney and Romney cross wools. This group is divided usually into fine crossbred, medium crossbred, and strong or low crossbred.

Fine crossbred wools are made into a variety of materials, including uniform cloths of all descriptions, overcoating material, sports tweeds, rugs, blankets, dress fabrics, and suitings.

Medium crossbreds are used for cloths with an accent on durability and warmth. Army uniforms, overcoats, blankets, working clothes, sports tweeds, and serges are a few of their uses.

Strong crossbreds are made up into furniture upholstery, felts for use in industry, braids, bunting, and coarse tweeds.

Well-grown crossbred wools, shafty and clean, have always been well-favoured by American, British, and Continental wool buyers.

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English oak (*Quercus robur*): A tree of medium height with a spreading crown; growth not good on very light soils.

Turkey oak (*Quercus cerris*): Quicker growing than the English oak.

Pin oak (*Quercus palustris*): A medium tall tree with a conical crown; succeeds in wet and heavy soils.

Scarlet oak (*Quercus coccinea*): Taller than the pin oak; succeeds in dryish soils.

Lime (*Tilia europea*): A tall tree with a conical crown; sweet scented, and attractive to bees when flowering in early summer.

Sweet chestnut (*Castanea sativa*): A medium tall tree with a broad, spreading crown; grows well in alluvial soil.

Horse chestnut (*Aesculus hippocastanum*): A shorter tree than the sweet chestnut, with a wide, rounded crown; slower growing. Variety *A. carnea* has red flowers.

Ash (*Fraxinus excelsior*): A medium tall tree with an open crown; grows best only on good, deep soil.

Tulip tree (*Liriodendron tulipifera*): A tall tree with a conical crown; best grown on good moist soil; somewhat difficult to transplant.

Paulownia imperialis: A small tree with a spreading, open crown, handsome foliage, and purple flowers; in the South Island grown only in warmer localities.

Balsam poplar (*Populus balsamifera*): A tall tree with a fairly-narrow crown and handsome spring foliage.

Aspen (*Populus tremula*): A tree of medium size with attractive foliage; a good tree for growing against an evergreen background.

Lombardy poplar (*Populus nigra fastigiata*): A very tall tree with a characteristic narrow crown; good for planting as a background or mixed with conifer species.

Walnut (*Juglans regia*): A low tree with a rounded, spreading crown; foliage very late to emerge; does not grow well in a mixture and is best planted in a wide-spaced, one-species avenue; needs good soil.

Robinia pseudacacia: A tall tree with a sparingly-branched crown and attractive foliage and flowers; good in a mixture with evergreen species.

Maidenhair tree (*Ginkgo biloba*): A slow-growing tree of medium height with attractive foliage; hardy and stands exposure to wind.

Evergreen Species

Evergreen oak (*Quercus ilex*): A tree of medium height with a conical crown; stands dry conditions.

New Zealand silver beech (*Nothofagus menziesii*): In its early years forms a compact, conical crown.

Totara (*Podocarpus totara*): Stands poor soil and dry, exposed conditions.

Titoki (*Alectryon excelsum*): A small tree with a rounded crown; can be grown on almost any soil.

Pohutukawa (*Metrosideros tomentosa*): For coastal planting.

Wellingtonia (*Sequoia gigantea*): A very tall tree with a characteristic pyramidal shape which requires ample room for development; hardy.

Some species of acacia, especially black wood (*Acacia melanoxylon*) and black wattle (*A. decurrens*), form straggling crowns and are best grown in the background of planting, but bear prolific golden blossoms in late winter or spring.

Some species of eucalyptus, especially *E. ficifolia* and *E. calophylla*, both with coloured flowers, and *E. cinerea*, with beautiful silver foliage.

Lawson's cypress (*Cupressus lawsoniana*).

Cedrus deodara and *C. atlantica*.

Cryptomeria japonica.

Puriri: Suitable for the North Island and Nelson.

Abies species, specially *A. nordmanniana*, *A. nobilis*, *A. concolor*, and *A. pinsapo*, which flourishes in dry, exposed situations such as the Canterbury Plains. If given sufficient room, these species form a compact, pyramidal tree with branches persisting to ground level.

Small Trees Suitable for Short Driveways or where Space is Restricted

Deciduous Species

Japanese maples.
Mountain ash (*Pyrus aucuparia*).
Idesia polycarpa.
Liquidambar styraciflua.
Silver birch (*Betula alba*).
Prunus species.
Kowhai (*Sophora tetraptera*).

Evergreen Species

Pepper tree (*Schinus molle*).
Acmena floribunda.
Laurel (*Laurus nobilis*).
Cupressus retinospora.
Juniperus communis.

Native Species
(suitable for filling in between tall, wide-spaced trees)

Ngaio.
Broadleaf.
Mahoe.
Southern rata.
Pittosporum eugenioides.
Pittosporum tenuifolium.
Lacebark.
Karo (*Pittosporum crassifolium*).
Karaka.

Trees with Autumn or Coloured Foliage

Poplars.
Liquidambar.
Tulip tree.
Golden ash.
Ginkgo.
Copper beech.
Scarlet oak.
Japanese maples.

Species for Coastal Districts

Pohutukawa.
Broadleaf (*Griselinia littoralis*).
Ngaio.
Karaka.
Acacia pycnantha.

Trees Unsuitable for Driveway Planting

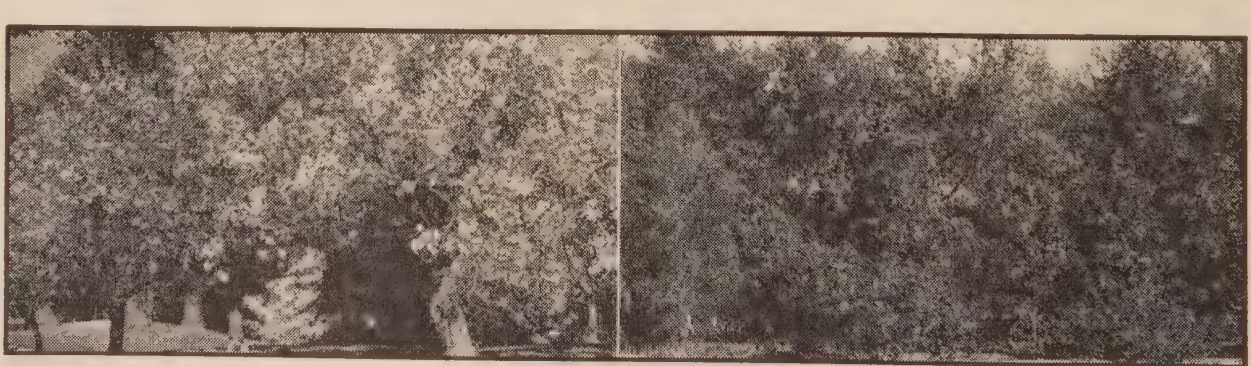
Elms: may drop large branches without warning.

Sycamore: Excessively-spreading branches; produces masses of seedlings which become weed growth difficult to eradicate.

Monkey puzzle (*Araucaria imbricata*): Drops dead branches and cone scales; becomes unsightly.

Pinus radiata: Grows rapidly and its branches overshade all nearby trees and vegetation.

New Zealand cabbage tree: If planted alone, in time they become unsightly and persistently cast their large leaves untidily on the ground.



Left—Flowering cherry trees along a margin make a good spring display. Right—A line of silver birch forms an attractive background for a driveway. After the leaves have fallen the silver trunks remain beautiful.

Trees and Hedges for the Approach to the Farm

THE advantages of an efficient and attractive approach to the homestead or farm, and different types of access roads and ways of planting them with trees to serve also as shelter, were described in the first half of this article by M. Sutherland, Farm Forestry Officer, Department of Agriculture, Wellington, which was published last month. This section deals with the details of planning and laying down farm access, giving examples of several planting arrangements and a list of trees suitable for this purpose.

IN planning for beauty and utility in the approach to the farm, many basic points must be considered.

In ordinary circumstances the driveway should lead as directly as possible from highway to homestead. A curved driveway is more attractive than a straight stretch of road, and that effect can often be obtained by an angle approach to the house. Efforts should be made to choose a line of approach that reveals the most pleasant view of the house. In the early stages of development of a farm it is easy to establish that the shortest line from the highway to the door of the house is the only possible route, but later it is often found desirable to improve on this. If the route lies on the flat, there is no difficulty in choosing a direct line, but care must be taken to avoid winter-wet areas or the road will cause endless annoyance and require expensive maintenance. If a slope is to be surmounted, the way of least resistance following a contour will probably require less upkeep than a road taken straight up the hill, and will also provide a more attractive approach. In many cases a driveway can gain natural protection along the sheltered slope of a hill.

The character of the driveway must be decided: Will it be simply an approach to the home, or will it have to serve as both driveway and working route for farm traffic and stock? Will the margins be planted up with trees or shrubs and, if so, is it possible to incorporate this planting as part of the general farm shelter system?

How much land can be spared for the formation of access to home and farm? The character of the layout and the amount of planting possible depend on the space available. Where possible, provision should be made for the formation of an easy turning loop in the driveway near the house.

All amenity shelter planting must be protected from damage by stock, and consideration must be given to the extent and availability of the fencing necessary and its future maintenance. Failure in the upkeep of fences bordering planted driveways, especially in early stages, may mean the destruction of the whole effort. In most cases double fencing of the marginal planting is necessary. If cattle stops are used to prevent entry of stock to the roadway, the inner line of fencing may be dispensed with, giving a much pleasanter effect to the driveway.

The type of driveway chosen depends on the considerations listed and on the direction of the prevailing wind and how the land lies to the sun. These factors decide whether it is to be lined with trees or hedges on one or both edges, whether tall trees are to be used, in single or multiple lines and with or without graded planting, and finally the choice of species.

When the extent and width of the proposed driveway have been settled to make the best use of the area it is necessary to work out the exact positions of planting with reference to the house and to local topography and soil types, and to decide details of the spacing of the trees. The best way to do this is to draw out a simple scale plan so that the exact relationship of the plantings may be followed easily. When first planted the trees may appear too sparse, and the inclination is to plant closer, but this desire can be checked by referring to the space which will be required in 20 or 30 years. Care must be taken that trees will not interfere with existing or possible future power lines.

A Plan to Scale

Before planting of trees or shrubs along a driveway is started—in fact, before construction is started on a new layout—it is a great help to map on paper the plan of action which it is proposed to carry out. Even though a complete scheme is outlined to cover several years' operations and it is possible to carry out only a small portion at a time, the mere formation of a plan serves as a goal toward which to work by the completion of a section each year. Making the plan need not be difficult. If a large-scale map of the farm is available, it is simple to mark on it the proposed route of the driveway, adjusting its position by checking it on the ground.

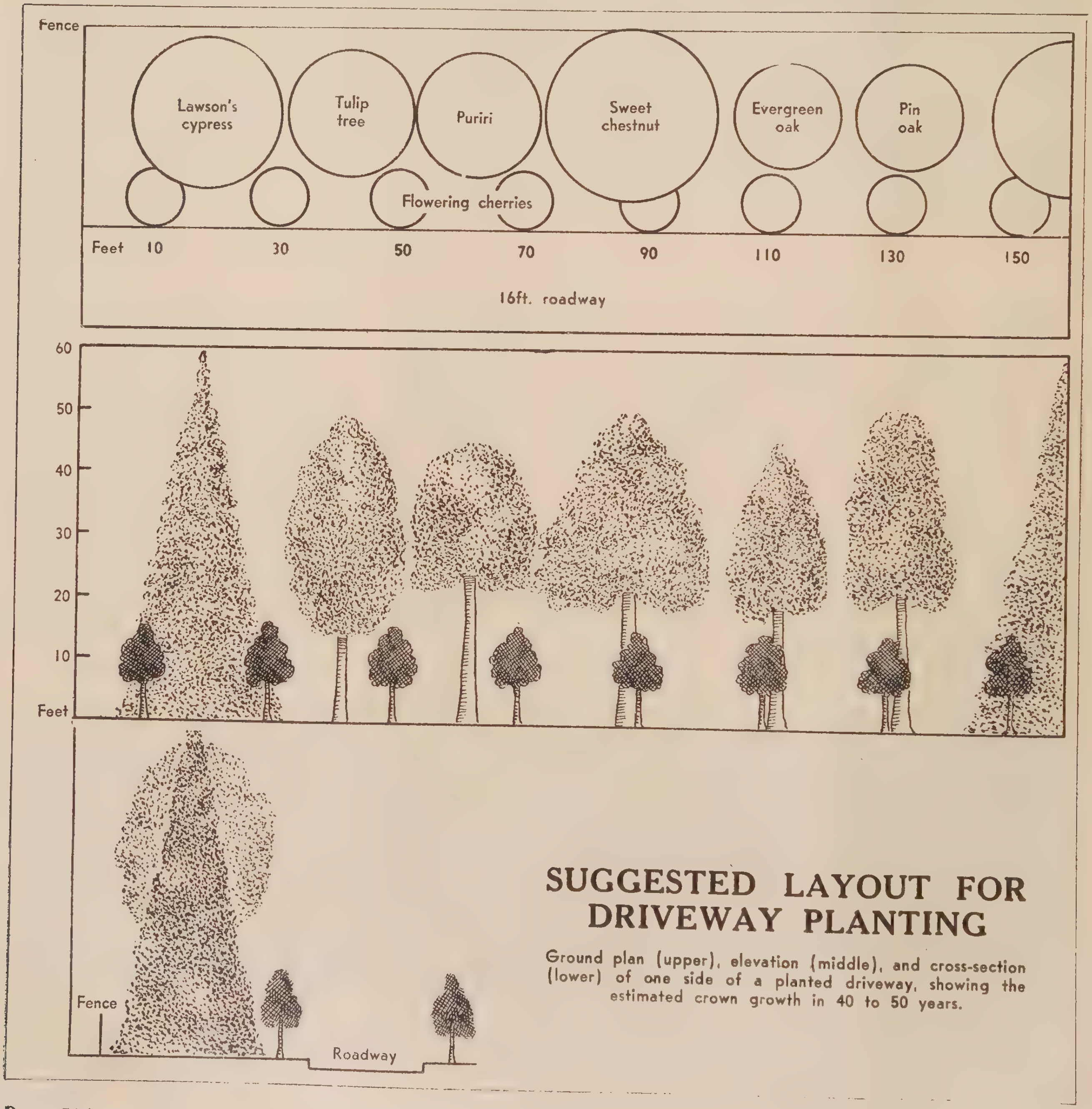
The next step is to draw diagrammatically a short section of the roadway, showing on a large scale the most suitable arrangement of species and the correct placing of each tree to give it sufficient room for height growth and crown spread. To draw this plan it is simplest to use paper ruled off into squares, a useful scale being 10 squares to 1in. representing 20ft. To make the plan of practical assistance it is advisable to mark on it the area which each tree is estimated to cover after a number of years, possibly 20 to 30. Such a plan is shown in the diagrams on this page, which indicate the planting up of a driveway margin with a mixture of tall conifer and deciduous trees planned to grow to their full height and width.

If possible, the roadway should be wide enough to allow two vehicles to pass, requiring a minimum of say 16ft. That can be reduced, if desired, where the route is flat and where cars can pass by overrunning the formed margin if necessary. No trees or bushes should be planted nearer than 5ft. from the edge of the roadway, partly for their protection and partly to prevent overhang of branches or crowns which might cause shading or impeding of the road. The lower illustration on the opposite page shows the result of planting trees far too close to the road.

Traffic Turning Loop

A circular turning loop for vehicles may often be formed in combination with the garden layout, the centre area being used for flowers or shrubs. Unless the turn-round is planned on an ample scale, in which case it may rather be considered as two roads, it is not a good plan to grow trees within the loop, as they may become too high and shade the driveway.

An efficient turning loop may be formed on an area of ground about a chain square, the most important measurement being the inner diameter of the loop, which should allow for the turning of long vehicles or implements. The shorter diameter of the centre



SUGGESTED LAYOUT FOR DRIVEWAY PLANTING

Ground plan (upper), elevation (middle), and cross-section (lower) of one side of a planted driveway, showing the estimated crown growth in 40 to 50 years.

Left—A short driveway with an efficient turning loop serving house and farm buildings. Right—Trees planted on the turning loop may grow too high. *Photograph at left by Sparrow Industrial Pictures Ltd.*

plot shown in the illustration above is 33ft. bounded by a 15ft. road, the long axis being 87ft. This driveway gives access to the house on the left and to the farmyard and buildings in the background.

Choice of Species

When the planting up of a farm driveway is planned as part of the shelter system, the choice of trees or shrubs is restricted, as they must be selected chiefly for their value as shelter and the purely utilitarian arrangement may not be very attractive. However, shelter value and beauty can be combined by a judicious mixture of species in the routine planting or by the addition on the interior road margin of some irregular planting to introduce variety. For example, a background of evergreen conifer species may act well as a foil to display the beauty of shape or colour of spaced, broad-leaf trees planted on the margin; a few trees with autumn foliage bring an attractive splash of colour, and flowering trees such as cherry or wattle introduce a seasonal variation.

The main considerations in the choice of trees or shrubs to border a roadway are their height and the spread of crown or side branches. For a breakwind good height growth is necessary, but that may prove a disadvantage if trees are placed too close to the road. Where tall trees are grown in a driveway care should be taken that this high planting ceases at a reasonable distance from the house so that the trees will not overshade or dominate it. The surface spread of the crowns or side branches is of special consequence when dealing with trees which retain their branches to the ground and normally occupy a large area of ground space. In these cases the increase in area required as the tree grows older must be foreseen.

A driveway with only 14ft. between the trees on either side of the road, which is too narrow when the trees have grown.

The first consideration in choosing trees or shrubs should be their suitability for the soil and their consequent rate of growth, and then their growth habit in relation to the maintenance required to keep them neat and tidy. Some trees and shrubs become troublesome by their prolific shedding of branches or large leaves—for example, New Zealand cabbage trees or palms; some rapidly produce long straggling branches which require frequent trimming, and others become a menace by prolific suckering.

Use of Temporary Species

The use of temporary, rapidly-growing species may be necessary for initial protection of the slower and less hardy species which are suitable for permanent planting. That may apply when either hedges or tree belts are required, and two species which make especially good nurse trees are tree lucerne or tagasaste (*Cytisus proliferus*) and brush wattle (*Albizzia lopantha*). The nurse trees may be grown on the exposed side of the permanent plants, which will then make more rapid initial growth than they would if left unsheltered and the driveway will thus be furnished with a living border within a reasonable period. When the permanent plants have a start the protecting trees must be removed, or the permanent species may be overshaded and suppressed.

It is not possible to list species suited to each kind of soil or locality, but an attempt has been made to list those whose characteristics make them particularly suitable for planting in more open formation than is adopted for massed plantations, or for decorative rather than utilitarian purposes The best way to make a choice of species for the soil type and locality is to note the species already growing on similar sites in the district, and local nurserymen will give information about the suitability of species not already represented in the locality. The lists given with this article include trees and shrubs which have a general application for planting in New Zealand.

◆

Correspondence School Courses in Agriculture and Horticulture

THE range of subjects which may be studied through the Correspondence School of the Education Department is wider than is generally realised, including such courses as those in general agriculture, dairying, animal husbandry, horticulture, and botany. They are available not only to pupils taking the usual school subjects, but to adults who may be interested but do not wish to sit examinations.

THOUGH most of the courses are written primarily for pupils sitting examinations, much of the material in them will be of interest and benefit to the young farmer or the home horticulturist who does not wish to sit an examination. No great outlay of time is necessary, and the student can work at his own pace. The only proviso is that no similar course (for example, in night classes) is available locally or convenient for the student. Very few such classes are held in New Zealand, and these correspondence courses may fill a long-felt want of the young farmer or the home horticulturist who wishes to extend his knowledge in any particular subject or wishes to gain an insight into the scientific facts behind some branch of farming or cultivation.

The tuition fees are nominal, and text books are supplied for a small hire fee. Further information is available from the Headmaster, Correspondence School, Education Department, Clifton Terrace, Wellington C1.

Details of Courses

The principal topics covered in the main long courses are:—

General agriculture: How a plant grows; seed certification; soils, fertilisers, and manures; crops and pastures; main types of animal and plant life of interest to the farmer.

Dairying: Milk, cream, butter, and cheese; their production and sale; herd testing and herd improvement; care and management of the dairy cow; use of dairy by-products.

Animal husbandry: The cow, pig, horse, and sheep; principal breeds; current economic problems in stock farming; wool; pastures and their management; supplementary feed crops; animal genetics; simple physiology of animals; diseases of animals.

Horticulture: Simple plant physiology; the flower, fruit, and vegetable gardens; trees and shrubs; fertilisers and manures; the soil; common pests and diseases; lawns; sprays and insecticides; plant breeding. Practical gardeners will find much to interest them in this course.

Botany: The root, stem, leaf, flower, and fruit of a plant; plant physiology; chief characters of plant families; various types of lower plants.

More than one course may be taken concurrently, and, in general, the courses may be completed in 2 years, with a third and revisional year's course available. Each year's work consists of 16 sets, each of which is divided into 3 sections—reading work, written questions based on the reading work, and practical exercises based on the reading work. For these exercises every pupil has a box of apparatus sent to him. As the exercises are completed they may be written up in detail, illustrated by diagrams, and sent in for comment with the written work.

In agriculture and horticulture practical plot and garden work can be done, and an illustrated plant album containing coloured drawings of flowering plants, shrubs, and vegetables is circulated among horticulture students. Current and some back numbers of "The New Zealand Journal of Agriculture" and other periodicals are sent out regularly, and certain specialised books from the school's Young Farmer and Country Life and Garden Circle Club libraries are available on request. Broadcasts are given on current topics.

Subjects for the junior examination of the Royal New Zealand Institute of Horticulture may be studied, and again pupils taking the courses only for interest need not sit an examination. The subjects available are:—

Horticultural botany, a junior course consisting of 16 sets, written for pupils who have not studied botany. It can also be used as an introductory study of botany for forestry students.

Principles of plant protection, dealing with certain garden pests and their control. This course is in skeleton form only at present.

Chemistry, as for School Certificate. This is normally a 3-year course.

Book-keeping, a course which can be covered in 2 years.

Students may take these subjects in any order or combination. A copy of the institute's syllabus and a general guide to students who wish to sit the examinations in horticulture for the diploma can be obtained from the Secretary, the Royal New Zealand Institute of Horticulture, Box 1368, Wellington.

Short Courses in Agriculture

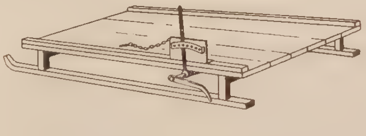
Originally intended for young men who had not been able to study an agricultural course at a secondary school, the short courses in agriculture have been taken successfully by men and women of all ages. They are suitable for people who wish to study only one aspect of farming or who cannot afford the time for sustained study. The courses vary in length from 3 to 12 sets and are merely an introduction to each subject, enabling the student to read intelligently more advanced technical books. The courses offered are: Introductory course; dairy science; fertilisers; farm and orchard crops; pastures and pasture plants; soil science; farm pests and diseases; dairy husbandry; agricultural botany; sheep farming; poultry farming; beekeeping; conduct of meetings and duties of secretaries; farm book-keeping.

Postage is paid by the Correspondence School, Education Department, Wellington, and a section of the school library is available free to students. Any other secondary-school subject not provided for by local classes may be studied by correspondence.

Brake for Sledge or Konaki

ON hill farms the use of a sledge or konaki is frequently necessary to haul materials such as fertiliser, lime, and fencing timber up relatively-steep slopes. Even in fine weather, when the foothold for horses is fairly secure, this can be exhausting work, but on surfaces soft and slippery after heavy rains it becomes a trial of endurance unless loads are reduced considerably. Resting horses on long pulls is desirable, but it is not always possible to find reasonably-level ground on which to halt the sledge. Merely stopping on a steep slope where the full weight of the load still has to be held to prevent it from slipping back hardly allows an adequate spell for the animals. The strain on them is still considerable, and they are in little better physical condition to continue the haulage after the so-called spell than they were when brought to a halt.

To overcome this the brake illustrated has been fitted to a sledge. The essential parts are two iron spikes fitted one to each end of an axle that runs across the sledge below the decking, a lever, and a quadrant within which the lever works.



The lever is attached to the axle, and moving it forward or backward rotates the axle. When the lever is in full forward position the spikes are held nearly horizontal; when the lever is drawn back the spikes tend to drive into the ground. The lever can be held in place by inserting a peg in a hole in the quadrant. When halting his horses on a steep slope the driver removes the peg and draws the lever back, inserting the peg again to keep the lever in position. The weight of the sledge and load is then on the two spikes and not on the horses. As a precaution against back slip the spikes can be left trailing while the sledge is travelling over a slippery slope.

—*C. WALKER,*
Assistant Fields Superintendent,
Department of Agriculture,
Palmerston North.

CAULIFLOWERS AND BROCCOLI

THE cauliflower is a member of the brassica family and is known botanically as *Brassica oleracea botrytis cauliflora.* Statements as to the exact origin of the plant are somewhat conflicting, but agree generally that the plant in a cruder form, at least, was under cultivation before the Christian era. Broccoli is known botanically as *Brassica oleracea botrytis cymosa* and like the cauliflower is a cultivated variety of the wild cabbage which originated in the coastal regions of England, Wales, and Southern Europe. However, the cauliflower and broccoli of today are far removed from the very ancient types. As the cultural conditions for both cauliflowers and broccoli are to a great extent similar, this article by W. G. Crawford, Instructor in Vegetable Culture, Department of Agriculture, Dunedin, deals with these vegetables as one, though separate references are made where practices for cauliflowers and broccoli differ.

IN the past few years there has been a great increase in the production and consumption of cauliflowers and broccoli in New Zealand. Cauliflowers, however, are not by any means an easy crop to grow and it has been said that the test of a good gardener is his ability to grow them. The cauliflower, more so than broccoli, is very exacting in its requirements of favourable conditions, if satisfactory production and distribution of supply to suit markets is to be achieved.

The white colour and tenderness of cauliflowers make them an attractive dish of increasing popularity. Moreover, they provide minerals which are important to health and are probably the most rapidly digested of all vegetables.

Climate and Soil

Where high quality and good yields are expected cauliflowers and broccoli are exacting in their climatic requirements. Cauliflowers grow best under comparatively cool temperatures and in a moist atmosphere. The plant is very sensitive to checks in growth due to unfavourable conditions such as very dry or drought weather, temperatures which are too low, or exceptionally hot weather. Premature maturing of the curd, often referred to as "buttoning," will sometimes result from the unfavourable conditions mentioned, which also induce "riceyness" or "fuzziness" of the curd.

If grown properly and hardened off before winter frosts begin, broccoli are not as liable to injury and setbacks as cauliflowers, though broccoli growing should be confined to districts where winter temperatures are not too severe. This is exemplified by the fact that in the main the highest-producing and best commercial areas in New Zealand border the sea coast. Districts in which the winter temperatures are normally low for any length of time are not suitable for good broccoli production. The more gradually plants can be hardened off before the winter and before severe frosts commence, the better they can stand the climatic conditions prevailing in winter.

Soil requirements for cauliflower and broccoli are somewhat similar. The cauliflower is grown successfully in many parts of New Zealand on a number of different soil types, but quality and yield are highest when it is grown on loamy soil rich in organic matter and having good water-holding capacity. The plants must have an adequate supply of moisture throughout the growing season, but an excessive amount due to bad drainage is harmful.

To supply moisture not only at the time of transplanting the crop but also throughout the whole of the growing period, high humus content in the soil is necessary. High humus content gives bulk to lighter soils, lightens heavier ones, and provides better aeration and penetration of moisture in the soil. Unless they are heavily manured, very light, sandy soils should be avoided if possible.

Broccoli, which are grown mainly for winter and spring harvesting, require much the same soil conditions as cauliflowers, but in determining a suitable site consideration must be given first to adequate drainage of the soil and to protection, either artificial or natural, from severe, cold prevailing winds. Every year considerable damage to crops is done in districts where the water-table is high or where the water-table rises as the winter progresses. Leaves droop, stem rotting sets in, and eventually plants collapse and die. For commercial gardens gently-sloping land with a northerly aspect is best. Sloping land is to be preferred to a flat area because surplus water drains away so much more quickly in the spring when in the course of harvesting and transporting the crop considerable treading of the land is unavoidable. If the land intended for the production of broccoli has no natural windbreaks, some sort of artificial windbreak should be erected.

Manuring and Soil Management

The aim of commercial gardeners is to grow plants of sufficient health and vigour to yield a uniform supply of heads of desirable size for market requirements. Small plants grown on poor land seldom yield desirable-sized curds. It is generally conceded that only well-developed medium to large plants are capable of producing desirable curds, and for that reason manuring, particularly for cauliflowers, is usually fairly heavy. Unlike many cultivated plants, cauliflowers have seldom been damaged by over-manuring.

No hard-and-fast fertiliser programme can be laid down for all the different types of land used for broccoli and cauliflower growing, as much will depend on the use the land has been put to in the past. Individual growers must experiment with fertiliser applications and draw their own conclusions from the results, but materials used in supplying plant food to this crop include:—

1. Green manures and remnants of previous crops grown.
2. Organic bulk manures.
3. Mineral fertilisers.

Green Manuring

As both broccoli and cauliflower do best on land rich in organic material, the practice of growing green crops and incorporating them with the soil is becoming most popular. Soil conditions and also the length of time allowed between crops will determine

[*Jack Welsh and Sons photo.*

Broccoli trimmed ready for shop display.

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which type of green crop is most suitable. Green crops improve the physical condition of the soil considerably and should be grown wherever possible.

Where the plough is used for turning in green crops care should be taken to see that sufficient time elapses between turning under of the crop and planting to allow for complete decomposition of the organic material. In recent years there have been partial crop failures due to the early setting out of plants before there has been time for decomposition of green crops. Discing or cutting up the green crop well before incorporating it into the soil will do much to hasten decomposition. Any remnants of previous crops should be treated in a similar manner. Though green crops do not supply much crop food value to the soil, they benefit the soil considerably by furnishing organic matter.

Bulk Organic Manures

Though it is rather difficult to obtain, farmyard manure is usually a well-balanced fertiliser. If it is available, it should be applied to the land as it is collected or stored under a waterproof cover to prevent rain from leaching out all the most valuable nitrogen. Urine from stables and cow byres is also most valuable when saved and spread over the land before plants are set out. If animal urine is diluted and used as a liquid manure to feed the plants, the greatest care should be taken not to wet the leaves, as the caustic nature of the urine may cause burning of the plant. The application should not be too strong, particularly during periods of dry weather, as tender surface rootlets may be injured.

Poultry manure when dried has from three to four times the value of ordinary farmyard manures and should be used with caution. Dressings of 1½ to 2½lb. per square yard are safe for cauliflower and broccoli.

Mineral Fertilisers

To produce cauliflowers of good quality it is essential that plants should not receive a check at any time during the growing period; therefore quickly-available fertilisers are needed to maintain a constant growth. The addition of nitrogen to the soil is usually necessary to produce satisfactory growth in the plants and generally it is supplied in the form of sulphate of ammonia or blood and bone, both of which give good results. Superphosphate is the chief phosphatic fertiliser used.

While no specific fertilising formula can be laid down which would be suitable for all the districts where cauliflowers are grown, the Horticulture Division's instructors in various parts of New Zealand know the amounts and types of fertilisers which will give the best results in a particular district and yet be economical, and growers should consult them.

However, the following is a general manurial programme which should prove satisfactory for cauliflowers:

Fertilisers: Blood and bone, 7cwt. per acre; superphosphate, 3cwt. per acre; and sulphate of ammonia, 1cwt. per acre.

[*Jack Welsh and Sons photo.*

Plant-raising frames as used on large holdings.

Method of application: Where previous crops have been grown the usual practice is to apply 5cwt. of blood and bone, 3cwt. of superphosphate, and ½cwt. of sulphate of ammonia as a base dressing two to three weeks before setting out plants. The manure is generally placed under the plants by manure drills running in the same direction as the rows of plants. The balance of the measure is used four to five weeks later for side dressing the plants when the ground is wet and just previous to the first hoeing for weed control.

With the exception of sulphate of ammonia the manurial programme for broccoli is similar to that for cauliflowers. In districts where heavy frosts are likely sulphate of ammonia should not be used, as the plants do not need the same vigour and leaf growth as do cauliflowers to produce satisfactory curds. Experience shows that broccoli plants of normal size and free from excessive growth and succulence develop a better curd and stand up to cold, wet, wintry conditions more satisfactorily than plants having more prolific growth. A well-balanced fertiliser programme having as its object plants of moderate size and vigour capable of going into the winter in a dormant condition is important. Plants grown on land where large amounts of nitrogen-furnishing materials have been used and where leaf growth is excessive and succulent are susceptible to injury by cold weather.

Plant Raising and Transplanting

Cauliflower and broccoli plants are most susceptible to abuse and, particularly with cauliflowers, any check in growth will have a tendency to produce small "button heads." It is therefore important in selecting a site for the raising of these plants to choose fertile soil capable of holding moisture, well drained, and easily pulverised. A loam of a sandy, silty nature is ideal and is easily worked to a fine texture. Heavy soil types which pack easily after heavy rain and soils which lose their moisture readily should be avoided as far as possible.

A fertile soil in its natural condition, without the addition of artificial fertilisers, will produce a better-type plant than a soil which has been heavily manured. If the land has been used extensively in the past, a light dressing of blood and bone and superphosphate, 1½oz. of each to the square yard, lightly worked into the soil two to three weeks before sowing the seed is recommended.

The amount of seed required to plant an acre will depend on the germination of the seed. In this connection the age of the seed, the weather conditions during the growing period, the ability of the soil to hold moisture, and skill in planting the seed are important factors. However, commercial growers generally sow 3oz. of seed to get sufficient plants for an acre. Seed is sown either with a hand seed-sowing machine or direct by hand in ½in. drills in rows 12in. apart running north and south. Distance between rows is governed by the type of inter-row cultivation practised. The principal objects in cultivating the seed-bed are to keep weed growth in check and to stop a soil crust from forming after periods of heavy rain. Seed sowing should be done from six to seven weeks before the time set for transplanting into the field.

Transplanting

The time for setting out main-crop cauliflower and broccoli plants will depend on local seasonal climatic conditions. In southern districts all broccoli should be transplanted during January, early cauliflowers for October and November harvesting during April (the same time as for early spring cabbage), and main-crop cauliflowers any time from the beginning of September to the end of November. If suitable varieties are selected, there should be continuity of supply throughout the year.

The number of plants for an acre will depend on the spacing required for the different varieties planted, but it is customary to allow wider spacing for cauliflowers than for broccoli. Cauliflowers are usually planted 2ft. 6in. apart and broccoli 2ft. apart, with 2ft. 6in. between rows in each case, though the distance between rows is governed largely by the type of machinery used for inter-row cultivation.

Overcast or misty weather is the most suitable time for setting out plants. Only good-sized, stocky plants 6 to 8in. high and with a well-balanced root system should be selected for transplanting; small, under-nourished, cramped plants with a poor root system should be discarded. If the ground in the seed-bed is dry on the day when the plants are required, it should be soaked with water some time before the seedlings are lifted so that when the plants are removed a little moist soil will adhere to the roots, thus minimising root damage. Only the best plants should be placed in a moistened container ready for setting out. It is more satisfactory to lift plants from the seed-bed with a small fork than to pull them out by hand.

If the weather is hot or dry at the time of transplanting, it is important that leaves be trimmed before the plants are set out. This applies particularly to broccoli, which are set out during January. Trimming consists of removing some of the leaf surface with a sharp knife, but leaving the stem of the leaves and the crown of the plant intact. With the reduction of the leaf surface by trimming there is little danger of the plant wilting provided the soil is moist.

During dry periods it is the practice among many commercial growers to puddle the roots by dipping them into a bucket of soil and water the consistency of thin porridge and this treatment has given excellent results.

A spade, dibble, trowel, or transplanting machine is used to set plants out in the field. The machine for this work is rather expensive for small commercial growers, but is proving quite satisfactory on large holdings. Three to four acres can be planted and watered in by the machine in an 8-hour day. However, the most commonly employed implements are the spade, trowel, or dibble. Plants are set out at intersections of rows previously marked out by machinery after the final cultivation. Where the spade is used for planting two operators are needed; the first inserts the spade where the plant is to be set and the second drops the plant in and at the same time firms the soil round the plant with his boot. Of the other two hand-planting methods, the trowel, though much slower than the dibble, is usually more satisfactory. The greatest care should be taken to see that correct distances are kept between plants, as uniformity of growth is important in this type of cropping. Standardised planting is essential where machinery is used for inter-row cultivation.

In southern districts broccoli are planted on ridges which run in the same direction as the water flow of the land. The ridge and furrow system has much to commend it. It facilitates drainage, allows for better aeration around the plants, renders the area easy to keep clean of weeds, and makes for a longer growing season because in the late autumn and early spring the soil keeps warmer than where the soil surface is level.

Varieties

The bulk of the cauliflower and broccoli seed grown commercially in New Zealand is imported from overseas, chiefly from U.S.A. and England. Successful cropping is possible only if the variety planted is suitable for the soil and climatic conditions usually experienced in the particular district. A large range of varieties of both cauliflowers and broccoli is grown in New Zealand, but those which are recommended for trial on account of their desirable type and successful cropping over a number of years are:—

Cauliflowers: Early London, Walcheren, Southern Cross, Veitch's Autumn Giant, All Seasons.

Broccoli: Veitch's self-protecting, Lily White Nos. I, II, III, IV, St. Valentine, Mammoth.

Pests and Diseases

The following descriptions of pests and diseases are given to assist growers in recognising the different troubles affecting cauliflower and broccoli crops. The list is not complete, but should prove a sufficient guide.

Aphis

The aphis is greyish in colour; it causes leaves to curl at the edges.

Control: For effective control spray early, using nicotine sulphate 1:800 plus soft soap (3 to 4lb. to 100 gallons of solution).

White Butterfly (*Pieris rapae*)

The caterpillar stage of the white butterfly is leaf green and has a velvet-like appearance. The caterpillar is found usually on the under side of leaves of plants. It eats the whole leaf.

Control: Spray the plants with 1½lb. of arsenate of lead and 6oz. of a wetting agent dissolved in 100 gallons of water. Spray the under sides of the leaves thoroughly. Alternatively, plants can be dusted with D.D.T. dust, 1 or 2 per cent.

Diamond-backed Moth (*Plutella maculipennis*)

The caterpillar of the moth is similar to that of the white butterfly, but is much smaller. It is greenish. When disturbed it drops on a silken thread. The caterpillar eats the lower surface of the leaf and causes it to have a tissue-like appearance.

Control: Spray or dust as for white butterfly.

Slugs (*Limax* sp.)

Slugs are particularly active during wet or cool weather. They eat the leaves as well as the curd, attacking plants at night.

Control: Trap with a poison bait. Mix a finely-ground meta tablet with 8oz. of bran, dampen slightly, and broadcast thinly over the infected area. If meta fuel tablets are not available, the following is a particularly good bait: Bran 12½lb., arsenate of lead ½lb., salt ½lb., and molasses ½ pint. Mix the arsenate of lead and bran dry. In another container break down the molasses with three or four times its volume of water and add to the poison bran sufficient to make a coarse, crumbly mash. Use the bait in the same way as the meta tablet bait. As the effect of a poison bait is destroyed by rain, it is a good idea to protect the bait with flower pots turned upside down.

Club Root (*Plasmodiophora brassicae*)

Club root is a slime fungus disease which attacks plants of the crucifer group such as turnips and swedes, and many ornamentals such as stocks and wallflowers. It is especially serious among brassicas. Affected roots develop a thick, swollen, and distorted-mass appearance.

Control: As the disease flourishes in acid soils, it is necessary to correct acidity by applying burnt lime at two- to three-year intervals at the rate of 1 to 3 tons per acre. Crop rotation should be practised as far as possible so that there is a considerable interval between the growing of host plants on the same soil; cruciferous crops should be excluded from affected land for at least three years. All plants should be examined carefully when they are being lifted from the seed-bed and any showing infection should be destroyed. Infected seed-bed soil should be treated with mercuric chloride. All diseased plants should be lifted from the soil carefully and destroyed by burning.

Black Leg (*Phoma lingam*)

Black leg produces black sunken areas on the stems near the surface of the ground and occurs generally in the seed-bed, being troublesome mainly in the early spring. It can also be seed borne.

Control: Only good, clean seed should be used.

Damping Off (Various Fungi)

Damping off shows as blackening at the stem base in the seedling stage and later induces the collapse of the plant. It is most common on early plants grown under glass during the late or early seasons.

Control: As the plant is attacked in the seedling stage by soil fungi, control can be achieved by sterilising the soil to kill the fungus or by disinfecting the soil with formalin or chloropicrin.

Downy Mildew (*Peronospora parasitica*)

Downy mildew is especially prevalent in young plants. It is a white, mealy, or furry fungus growth on the under sides of the leaves. The disease is most serious on young plants grown under frames, particularly during dull weather.

Control: Avoid very moist atmospheres. Leaves should be sprayed with Bordeaux mixture or Bordeaux substitute.

Whiptail

The leaves of plants affected by whiptail are misshapen, strap-like, and ruffled. Curds are usually of no commercial value. Whiptail is sometimes referred to as malnutrition disease. There is some evidence that the incidence of whiptail following heavy dressings of inorganic fertilisers is greater than the incidence of the disease following liberal dressings of blood and bone.

Control: In the Auckland cauliflower areas it has been demonstrated that applications of small quantities of molybdenum salts have cured the trouble.

PREPARATION OF SEED-BED FOR AUTUMN-SOWN GRASS

SEASONAL NOTES contributed by the EXTENSION DIVISION

MANY thousands of acres of land will be prepared in the next two or three months throughout the country for the sowing of permanent pastures. This preparation should be aimed at getting a suitable seed-bed for the reception of grass and clover seeds to be sown in early autumn when soil conditions are both warm and moist. On far too many farms costly grass and clover seeds are sown every year on seed-beds which are anything but good—seed-beds which are not deep, fine, and firm, but which are shallow, cloddy, rough cultivations, often underlain by air pockets among undecayed old grass turf or undecayed vegetable matter or rough, lumpy soil.

THE seed-bed is of major importance in the establishment of a good pasture, and every effort should be made, particularly when permanent pastures are being sown, to see that the best possible seed-bed is provided.

A good seed-bed for autumn-sown grass is one where the soil has been so worked as to give a deep, firm, and fine layer of fertile topsoil with no break between this layer of worked soil and the subsoil.

The seed-bed should be deep so that the young plants as they germinate will have plenty of room in which to develop rapidly the rooting system necessary to give strong, vigorous plants.

The seed-bed should be fine so that the earth is in close contact with the small grass and clover seeds, supplying them first with the necessary moisture for quick germination and next with food for quick growth of the young plants. The fine seed-bed also helps to prevent too deep burying of the small seeds, especially the clovers.

The seed-bed should be firm because in a loose, open, soft seed-bed a large proportion of the fine seeds of both grasses and clovers are easily buried too deep for germination when covered by the brush or grass harrows. The seed-bed cannot be too firm for good germination of clovers. A firm seed-bed also provides that close contact between the soil particles and the seedling rootlets necessary for the proper feeding of the young plants.

The development of strong and vigorous grass and clover plants requires a seed-bed which is fine, firm, moist, and warm at the time of sowing.

Before discing, light land should be rolled on the furrow to secure a consolidated seed-bed.

Finally the seed-bed should be as fertile as possible so that the young plants have a plentiful supply of food and can make good growth before the onset of cold winter conditions. The mixing in with the soil of decayed vegetable matter and the addition of minerals such as phosphate, potash, and lime are methods of improving fertility.

How to Get a Good Seed-bed

Land being prepared for grass seeding varies so much in type of soil, previous crop, and length of time available to get the land ready that it is impossible to lay down hard-and-fast methods for preparing a good seed-bed. Previous crops influencing the preparation of the seed-bed for autumn-sown grass can be divided into three main groups, and the recommendations which follow for seed-bed preparation after each group can be considered as generally applicable to any crop in a respective group.

In the first group are those areas being regrassed after a crop which is cleared from the land in spring or early summer. In this case the land should be ploughed as soon as possible in the new year to give time for any rubbish turned in to decay and for the furrows to settle down on to the subsoil again. A rolling immediately after ploughing in the direction of the ploughing will assist considerably in obtaining this result.

To preserve what moisture there is in the soil through January and February and also to keep the land free from weeds, an occasional discing and harrowing should be given through late January and February, by which time on most soils a very satisfactory seed-bed should be obtained. The long summer fallow under occasional cultivation allows natural processes to assist in the preparation of the type of seed-bed required. Plant food is prepared in the soil, moisture is conserved, the topsoil settles down firmly on the subsoil, plant refuse turned under rots away, and

SEED-BED FOR AUTUMN-SOWN GRASS . . .

the top layers can be worked down to a deep, fine, firm layer. The roller can and should be used further to firm the top layers of lighter soils.

Areas intended for regrassing after cropping are too often left idle to grow weeds and rubbish through the summer, and preparation is rushed through in a week or two just before seeding. Such preparation cannot possibly give the type of seed-bed necessary for good germination and quick growth. Even if the top of the seed-bed can be worked down to the firm and fine condition desired, the seed-bed will not have the necessary depth or link up properly with the subsoil.

The second set of conditions includes land which is being sown to grass after a crop such as rape or lupins which has been fed off, or after a cereal crop which has been harvested.

Where summer greenfeed crops have been fed off it is advisable to prepare the seed-bed not by ploughing but by cultivating the surface with such implements as the discs and harrows to give the desired fine and deep seed-bed with the subsoil firm and undisturbed. This is particularly desirable on the lighter soils, as the disturbance of the lower layers of the soil by the plough cannot be corrected by any amount of surface rolling. Another reason for not ploughing such fed-off areas is to keep the fertility of the residues of the fed-off crop and animal manure at the surface, where it is readily available to the young plants. If weeds, particularly twitch grasses, are not prevalent, the seed-bed provided by adequate surface cultivation of fed-off cropping areas gives excellent results in germination and initial growth of young pastures, which indicates that the seed-bed secured by these methods is generally suitable.

Where the land has been in a cereal crop cut either for hay or for grain, difficulty is often experienced, particularly on light soils, in getting a good seed-bed. The open, coarse, fibrous roots of the cereal keep the soil open and are slow to rot. The cereal refuse also tends to keep the soil loose, and the start of cultivation generally has to be delayed so that not much time is left in which to get the land ready. It is good practice under such conditions to plough as early as possible just deep enough to cover the cereal refuse and to roll immediately after ploughing, following the rolling with the discs and harrows to prevent drying out.

The point to remember is that soils settle and firm naturally if given time, the finer particles settling down to fill spaces between the larger ones. The longer the land is in the course of preparation the more time there is for natural assistance in the process. The roller is an important implement in the firming of the seed-bed, and it does much more effective work on the furrow than it does later in the cultivation. After discing and harrowing the roller does no more than firm the immediate surface, which, of course, helps effective germination of the finer clover seeds such as white clover.

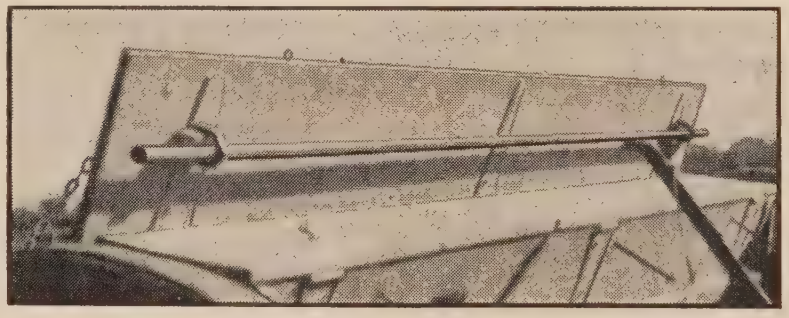
Late and hurried work in preparing land for grass seed after cereals is seldom satisfactory on light soils and is not good on most soils.

The third, though less common, condition is where an old pasture is broken up for renewal without an intermediate period of cropping. On light country and not-so-fertile country where good crops cannot be grown this method of pasture improvement should be used far more than it is. The value and advantages of what might be called direct reseeding after the plough are, however, becoming more widely known, and in many districts this method should be looked on as standard practice.

To get a really good seed-bed the old pasture should be carefully ploughed about November or early December while the moisture is still in the ground. To prevent drying out, particularly on clayey soils, the ploughed land should be disced immediately, and in really dry weather the discs should be kept right up to the plough. On lighter land rolling on the furrow should precede discing so that the old turf is pressed into the subsoil to start the rotting process. If old turf is left with air spaces between it and the subsoil, little rotting will take place, as the turf will dry out too much later.

During summer the land should be regularly worked as deep as possible with the discs. Such cultivation immediately after wet weather will be found much more effective in breaking down clods on clayey land and in consolidating light soils than where such work is left till the land dries out again. Toward the end of January and throughout February much can be done to conserve moisture and assist the rotting process in the turf by going over the area with the tine or chain harrows. By the end of February land prepared in this way should be in excellent condition to take grass seed. The surface should be fine, firm, and free from weeds, and the lower layers should be well knitted to the subsoil, with the turf nicely rolled and ready to supply plant food to the young pasture plants.

SAFETY ATTACHMENT FOR A DRILL



DRAWN by tractors, many of which are able to turn on a short radius, drills are often swung round quickly, and it is then, and also when the drill is moving over uneven ground or when the coulters have to be lifted to clear them of obstructions or to check the flow of seed or manure, that the operator needs to have a firm grip on some part of the drill. The practice of throwing open the lid of the manure box so that the back of the box affords a hold for the operator is not altogether satisfactory, as a jolt may cause the lid to close unexpectedly.

A North Canterbury farmer who felt that there was a need for some fitting on his drill which could be readily and securely gripped when necessary thought of the simple idea illustrated. It consists of a length of 1in. piping supported by two 2in. blocks of wood, the piping and the blocks of wood being secured to the lid of the manure box by two U bolts.

Not only is this attachment quite satisfactory as a grip for the operator of the drill, particularly if a roller or a set of harrows is being drawn behind, but it also serves a useful purpose when the drill is covered in the paddock. When the cover is removed from the drill after wet weather the woodwork and even the manure in the box are often found to be quite damp. The piping holds the cover up clear of the drill, and air circulating freely between it and the drill keeps both woodwork and manure dry.

—*E. C. D. WITHELL,*
Fields Instructor, Department
of Agriculture, Rangiora.

Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in January as under:—

Auckland—1YA, on January 25, at 12.35 p.m., "Preparation of Pigs for Agricultural Shows," by A. F. Barwell, Supervisor, Bay of Plenty District Pig Council.

Wellington—2YA, on January 20, at 12.35 p.m., "Breeding Programme: Fitting Your Pigs to Feed Supply," by I. H. Owtram, Supervisor, Taranaki District Pig Council.

Organic Material for the Home Garden

By A. G. KENNELLY, Instructor in Vegetable Culture, Department of Agriculture, Christchurch.

THE addition of organic material to the soil is so important that home gardeners should have an understanding of the value not only of kinds commonly used, but also of others which are at present often neglected through ignorance of their nature. The latter category includes soot, sawdust, bones, and feathers, which are among the materials discussed in this article.

CONTRARY to popular belief stable manure is not particularly rich in plant foods. Nevertheless on most soils excellent crops can be produced continuuosly with no other fertilising, provided lime is applied judiciously. Samples of stable manure vary greatly, but the average contains about ½ per cent. nitrogen, ¼ per cent. phosphoric acid, and ½ per cent. potash; some of these constituents are slow acting and some quick.

Fresh, strawy manure should always be stacked to allow the straw to rot down before it is applied. For long storage it should be heaped under cover to avoid the leaching effects of rain and should be packed compactly by tramping as each layer is laid down, so that as little air as possible circulates in the heap. Finally the heap should be covered with a layer of soil to prevent loss of ammonia and so that it does not attract flies. When stable or even farmyard manure is piled loosely bacterial action is increased, excess heating takes place, and nitrogen is lost by being given off as ammonia. Burning or fire-fanging causes a breaking down of the straw or litter, the liberation of carbon dioxide gas, and consequent destruction of humus.

Stable manure is relatively low in phosphates and in this respect lacks balance. The practice now advocated by some authorities of sprinkling superphosphates on manure as it is voided in the stalls therefore has much to commend it. Superphosphate not only absorbs much of the escaping ammonia and accomplishes a saving in nitrogen, but also builds up the phosphoric acid content and makes it a more balanced plant food. Superphosphate is also a drying agent and to some extent a deodorant.

Cow and Bullock Manure

Cow or bullock manure differs very little from horse manure in its plant food value, but its physical effect on soil may differ greatly. It is a colder material than stable

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HEADING PHOTOGRAPH

The illustration in the heading is of seaweeds common on New Zealand coasts. The long, slender stems, strap-like leaves, and bladders are kelp (*Macrocystis pyrifera*); the finer seaweed covering the rocks is sea lettuce (*Ulva* spp.). Photograph by Green and Hahn Ltd.

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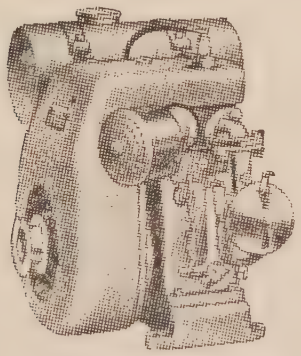

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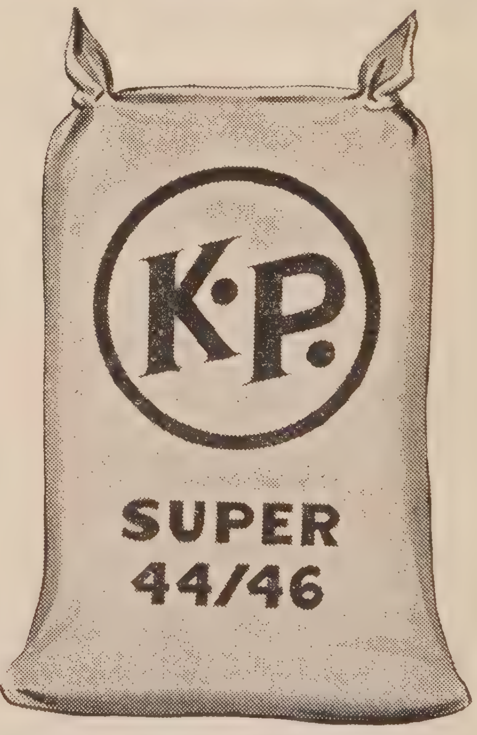

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manure and should be well rotted if applied heavily in the home garden. Bullock manure is usually richer than cow manure, but both are beneficial if used wisely on light soils; on heavy soils they should not be used continuously unless the effect has been tested on a small scale. Composted for several months with about four times its bulk of long, strawy horse manure, or even with sufficient straw to give a good, open mixture, cow or bullock manure usually gives good results. Cow and horse manure both vary greatly in quality according to the feed of the animals, method of storage, and age.

Sheep Manure

Sheep manure is a rich natural manure which decomposes readily and has no deleterious effect on soil structure. It makes one of the best liquid manures.

Poultry Manure

Poultry manure is one of the most valuable animal manures, and because unlike stable manure and most other farm manure it is likely to continue to be available to the same relative extent whatever the increase in urban population, application of this material to the home garden deserves consideration. The chemical content, and consequently the manurial value, of poultry manure varies according to the age, type of bird, and method of keeping and feeding, and also to the treatment and storage of the manure after collection. If collected properly and used correctly, it is an excellent fertiliser. Poultry manure is best and safest for all purposes when used in a dried form, as, if used fresh, there is a risk of its burning plants. However, because a portion of the nitrogen in fresh poultry droppings is readily available to plant life, poultry manure can be used as a fairly satisfactory topdressing in place of fertilisers such as nitrate of soda or sulphate of ammonia, provided the precautions which apply to the artificial manures are observed. That is, it should be applied in moderation and kept away from foliage, young plants, and seed.

A typical analysis of dried poultry manure is: Nitrogen 4.31 per cent., phosphoric acid 2.9 per cent., and potash 3.3 per cent. It contains, too, small quantities of calcium, iron, manganese, magnesium, and other minerals, which make it of considerable value in the treatment of mineral-deficient soil. Poultry manure decomposes rapidly when exposed to certain moisture conditions. Bacteria continuously change its composition and very little phosphorus and potassium is lost, though nitrogen compounds may be decomposed rapidly into gaseous ammonia, which escapes into the atmosphere. As much as half the nitrogen may be lost in this way.

The mixing of fresh poultry manure with wood ashes in an effort to improve its manurial value, or with lime to make it safe to use fresh, also results in loss of ammonia, and both practices are wasteful. Loss of plant food is rapid, too, if the manure is exposed to the leaching action of rain. The manure should be gathered and used as soon as possible. If short storage is necessary, the manure should be packed in covered boxes or barrels to exclude as much air as possible and so prevent it from heating and "burning" and losing much of its value. Storage is best accomplished by mixing the manure with 10 to 15 per cent. of superphosphate, which serves two purposes—it acts as a fixing agent for holding ammonia in the manure and it reduces decomposition by bringing about more rapid drying. In the fixing of the ammonia with superphosphate much of the phosphoric acid is changed to more insoluble forms which may not be readily available to plants in some soils. Probably the simplest and most economic method of preventing the loss of ammonia in poultry manure is to sprinkle superphosphate, at the rate of about 10lb. to every 100 birds, on the dropping boards of the fowlhouses. The trouble with this method, however, is that the superphosphate has an irritating effect on the birds' feet if the birds are left in the house.

Poultry manure is one of the most valuable manures for use on the compost heap, and where strawy materials are being rotted down it should be used at the rate of one part to three parts of material to be composted. The usual procedure of keeping the compost heap well formed, moist, and aerated should, of course, be followed. Poultry manure, if desired, can be used in conjunction with chemicals for raising the nitrogen ratio.

Home gardeners will also find it convenient to use poultry manure in liquid form. Fresh manure can be placed in a sugar bag or small sack suspended in a large container such as a 40-gallon drum or large barrel. After a week the liquid manure can be dipped out and used neat or diluted with an equal quantity of water, depending on whether the plants are young and tender or well established. The bag containing the poultry manure should be pressed from time to time to assist dilution.

Pig-sty Manure

Pig-sty manure is particularly valuable on light soil and is a rich manure particularly good when used in liquid form. Pigs are very efficient in the conversion of plant matter to animal matter and pig-sty manure from pigs that have been well bedded with straw could well be used more widely for vegetable growing.

OTHER ORGANIC MATERIALS

Sawdust

Until some years ago the practice of applying sawdust to the soil was generally considered to be harmful, or at best of no value. The scientific study of its physical and chemical action on the soil and the increased dissemination of scientific knowledge among gardeners, however, have changed the old attitude to sawdust. Because it is obtained from trees of widely-different character, with wood of varying hardness of grain and resin content (and consequently varying in its resistance to rotting-down organisms), and as different milling processes result in variation in the size of grain, sawdust is a variable material. Sawdust from some plants

[*Green and Hahn Ltd. photo.*

Bull kelp *(D'Urvillea antarctica)*, probably one of the commonest seaweeds found on beaches after storms.

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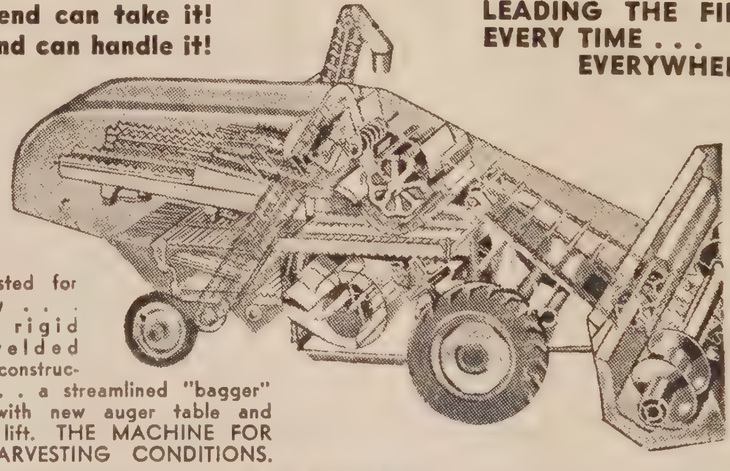

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[*Green and Hahn Ltd. photo.*

Spreading sawdust on the garden. Note how the left top edge of the shovel has been cut and bent over to prevent damage to the sole of the boot when digging.

contains a large amount of tannins and terpenes, which are inimical to plant growth, but its usefulness cannot be ruled out on this account; tannins and terpenes seldom remain long in the soil because the soil organisms destroy them. Another objection to sawdust is that it produces excessive acidity in the soil. Certainly softwood sawdust, which is the kind mainly used in New Zealand, contains less basic material than hardwood sawdust or most strawy material, but after it is completely decayed most of the organic acids are used by organisms or lost to the air, and there is only a neutral or alkaline residue.

Apart from an unfounded belief that the presence of rotting sawdust in the garden encouraged disease which was liable to spread to plants, the older generation of gardeners objected to sawdust because of the check to growth which usually resulted from the application of unrotted sawdust in large quantities. This check was due to severe nitrogen starvation; the large amount of carbon contained in sawdust brought about a temporary reduction in the amount of nitrogen available for crop growth.

Sawdust is a good source of carbohydrates, which serve as energy food for soil bacteria, and there is therefore a resultant increase in the ammonifying and cellulose-decomposing bacteria which require nitrogen for food in making protein for their own bodies. As these bacteria use the readily-available forms of nitrogenous plant foods, particularly nitrates, they compete with the higher plants, causing severe nitrogen starvation or "burning" of foliage and poor growth. Sawdust decomposes more slowly than, for instance, straw, which brings about a somewhat similar effect when applied to the soil, but the ultimate effect when protein nitrogen in the bacterial cells is converted to nitrates is beneficial.

The temporary check to plant growth can be avoided by rotting the sawdust first, which can be done in about 18 months by putting it on the compost heap. Fresh sawdust is very effective as a mulch 2 to 3in. deep, when it will kill most broad-leaf weeds. As a surface mulch it is particularly effective for plants such as rhododendrons, which are specially tolerant of acid conditions, and cuttings which like an acid medium often do well in it. For dwarf tomatoes, too, sawdust is a useful mulch, and it would possibly be effective under strawberries. In the home garden, however, sawdust will be valuable mainly for its physical action on the soil; the humus formed from sawdust improves the texture of the soil, adds to the cohesion of light soils and increases their capacity for retaining plant foods and moisture, and makes light-coloured soils darker, causing them to absorb more of the sun's rays and become warmer.

Seaweed

The value of seaweed as a manure has long been recognised. As far back as 1916 it was estimated that each year considerably more than 100,000 tons of fresh seaweed were gathered in France, and 250,000 tons in the United Kingdom and Norway. Fresh seaweed is watery and because of the cost of cartage it is usually advisable to dry it out somewhat by piling it on the beach for a few days before removal. Despite its watery nature seaweed compares favourably weight for weight with farmyard manure, and as it has the additional value that it brings with it no weed seeds or insect pests or diseases, home gardeners who live near the sea will find seaweed well worth collecting. Seaweed decays quickly and liberates its constituents in readily-available forms. In 1941 the Botany Division of the Department of Scientific and Industrial Research published results of investigations into the economic importance of seaweed which showed the manurial value as compared with ordinary dung. The figures are shown in the table below.

The relatively-low phosphate content makes it advisable when applying seaweed to add superphosphates. The potash, which is the most valuable constituent of seaweed, is readily available and may be lost if seaweed is exposed to the weather. When not used immediately seaweed should be dried quickly and stored compactly under cover. However, where seaweed is spread on the surface of the ground the potash washed out will be retained by the soil even though nitrogen will be lost, but salt washed out is not retained by the soil. On light soils it is best to apply seaweed in its wet state during autumn or winter so that the salt is washed out before planting time. In its wet state seaweed tends to make heavy soils more retentive of moisture and for such soils it should be dried first and then applied in July at the rate of about one or one and a-half barrowloads to 10 square yards. On light soils wet seaweed can be applied at double this rate. Composting of seaweed is unnecessary, but if used wet, seaweed is excellent for hastening the decay of strawy matter.

Seaweed can be used for all vegetables in the home garden. It is of special value for root crops and for green crops requiring potash, though for several crops, including potatoes, quality may be a little inferior to crops from areas on which farmyard manure has been applied. Seaweed is suitable for most fruit, but it is said to give grapes an earthy flavour. The relatively-high percentage of common salt in seaweed suits some crops; beet, cabbage, sea kale, asparagus, and

COMPARATIVE MANURIAL VALUE OF SEAWEED

	Nitrogen (lb.)	Phosphoric acid (lb.)	Potash (lb.)	Sodium chloride (lb.)	Organic matter (lb.)
1 ton average sample of wet seaweed	7 (0.3 per cent.)	2 (0.09 per cent.)	22 (1 per cent.)	35 (1.6 per cent.)	400
1 ton average well-handled farmyard manure ...	11	6	15	—	380

celery are either specially tolerant or benefit from it.

Because of their high and varied mineral content, seaweeds are likely to prove of value too on soils where deficiency diseases are troublesome.

Some of the most useful kinds of seaweed that are familiarly known on New Zealand coasts are:—

Kelp, or butterfish weed (*Macrocystis pyrifera*), which grows on permanently-submerged stones with the "leaves" buoyed up by gas-filled bladders at their bases.

Bull kelp (*D'Urvillea antarctica*) which grows on most exposed, surf-beaten rocks near low-tide mark in immense, broad-banded, leather-like masses and narrow, throng-like segments inside which is air-filled cellular tissue.

Sea lettuce (*Ulva* spp.), which is found on rocks, piles, or even on other seaweeds from high- to low-tide mark. The leaves are bright green, rather tough, and may be a foot square, though usually smaller.

Soot

For centuries soot has been much favoured in gardens as a manure and an insect repellant. In the main it is only an impure form of carbon. Its fertilising value is due principally to the small and variable proportion of ammonia it has absorbed from gases in the chimney. The ammonia, which makes it a nitrogenous manure, is mainly in the form of sulphate of ammonia in amounts ranging from 0.5 to 6 per cent., according to quality. Soot may also contain a very small amount of insoluble phosphoric acid, some iron oxide, a higher percentage of carbonate of lime, and up to 1 per cent. of potash. Its physical action on soil is beneficial, though likely to be limited at the rate it is usually employed. It darkens light soils, thus making them warmer and inducing earlier growth. Soot also improves the texture of strong clay loams.

[*Green and Hahn Ltd. photo.*

Weathered soot is a useful source of nitrogen.

Soot from domestic fires is of greater value than that from factories. Soot from coal only should be used and it should be three to six months old before being applied to crops.

Fresh soot has some value for protecting crops from slugs and snails, and before efficient insecticides came into general use it was used as a repellant for certain other insects.

Bones as Manure

Bones are very slow in action unless they have undergone some form of treatment to make more readily available the plant foods they contain, though on that account they are effective for many years. Where the home gardener has a quantity of bones to apply to the soil it is advisable to break them up with a hammer first. That can be done more easily if the bones are first buried to enable meat and excess fat to decompose. Apart from mixtures of dried blood and offal, bone manures on the market are usually in two principal forms: Bone meal or bonedust and steamed bone flour.

Bone meal or bonedust is finely-crushed raw bones. The presence of fat tends to hinder the decomposition of phosphatic and nitrogenous fertilising matter and the more immediate value of the material is largely dependent on fineness of crushing. The terms are often applied to any type of bone material that has been ground, which is misleading.

Steamed bone flour is prepared by grinding bones that have been submitted to steaming under pressure, which removes the superfluous fatty and nitrogenous matter.

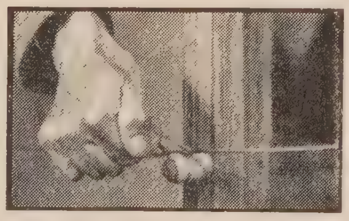
Bone manures act best on soils where lime is deficient or on soils rich in organic matter. They contain no potash but a fairly high percentage of phosphoric acid and may contain up to about 5 per cent. of nitrogen.

Feathers

Slowest in action of the nitrogenous manures, feathers yield about 8 to 10 per cent. of ammonia. They are best dug in during autumn or winter. As the shafts of large feathers take a considerable time to decay, small feathers are preferable.

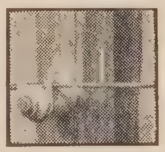
Quick Way of Fastening Wire to a Temporary Electric Fence

AN electric fence used for temporary purposes—for example, when winter-saved pasture is being fed off—must be moved every few days, and it should be capable of being dismantled and re-erected quickly. Frequently much of the time spent in re-erecting a fence is taken up by wiring or tying the conducting wire to the insulators. A quick and convenient method of holding the wire in position has been evolved by Mr. J. H. Taylor, of Ngaere, Taranaki, who in doing so has also found a use for discarded milking inflations.

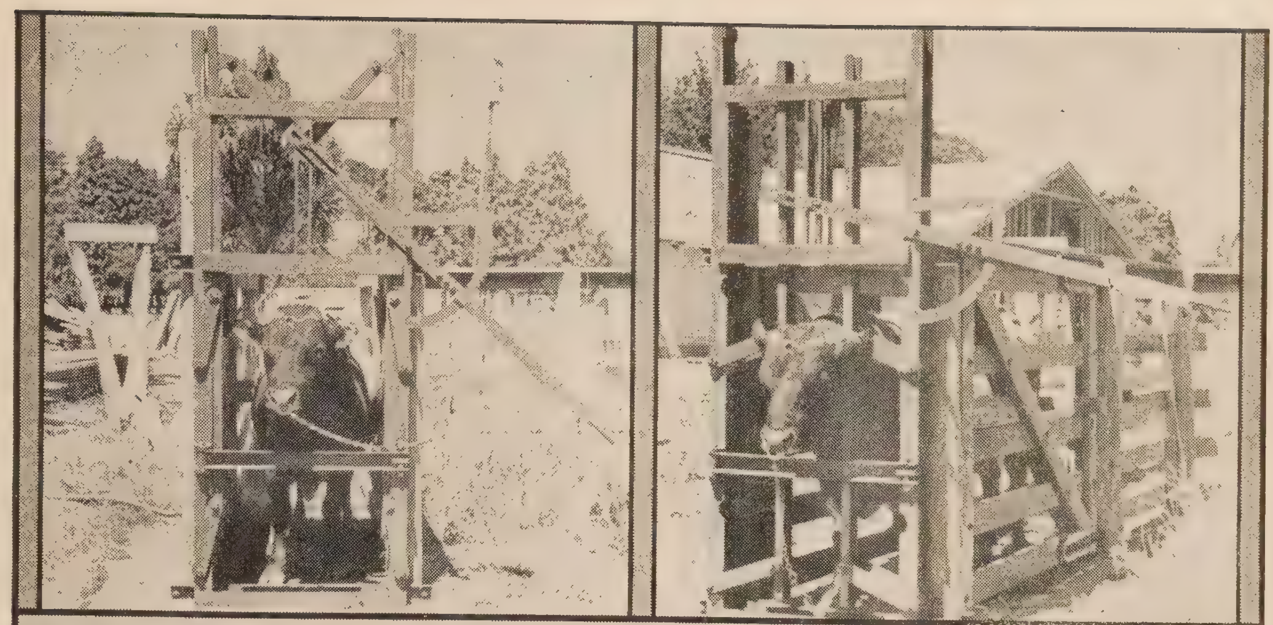


The inflations are cut into rings about 3/16in. wide; a narrower ring will not last long and a wider one becomes difficult to manipulate. To fasten a wire in position the rubber ring is first slipped over the insulator into the groove where the conducting wire is held. The ring is then stretched upward by hooking a forefinger into it. The wire is placed in the groove on the top of the insulator and in front of the stretched rubber band, which is then brought forward and downward and slipped over the insulator into the groove, thus holding the wire firmly in position.

When the fence is dismantled the rubber ring is slipped from in front of the wire and allowed to remain on the insulator for the re-erection of the fence. Spare rings are carried conveniently on the handle of the maul used to erect the standards or stakes carrying the conducting wire.

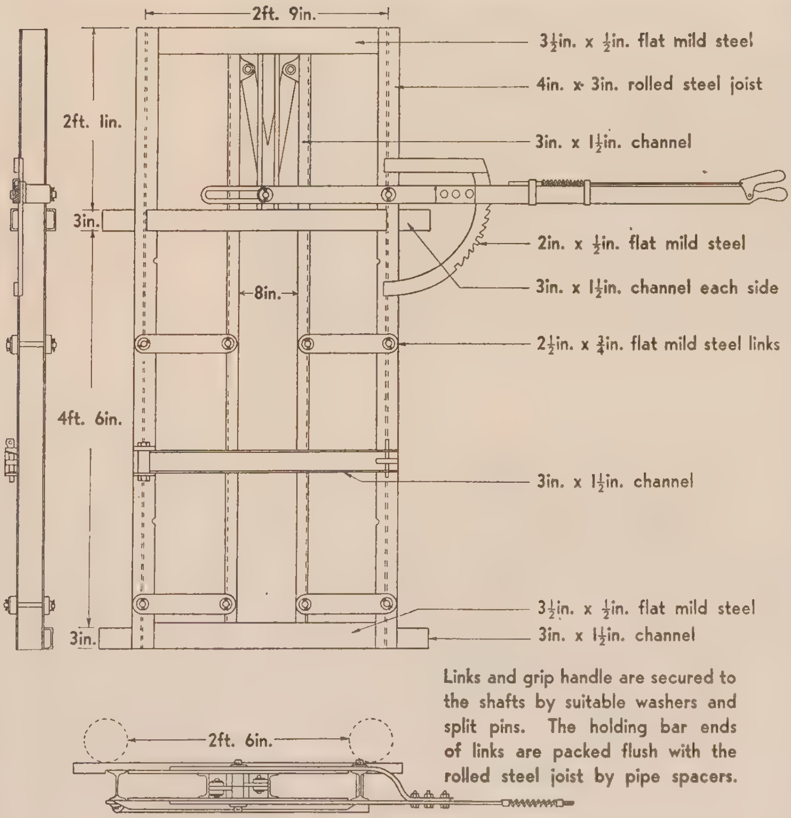


—C. E. BALLINGER, *Instructor in Agriculture, Department of Agriculture, Stratford.*



Lack of adequate facilities for handling heavy animals during such operations as dehorning and drenching is a serious handicap on some farms. This walk-through bail, designed and constructed at the Department of Agriculture's Animal Research Station, Ruakura, has proved very satisfactory. The diagrams below show the method of construction of the bail, which should be bolted to two sturdy posts set in concrete.

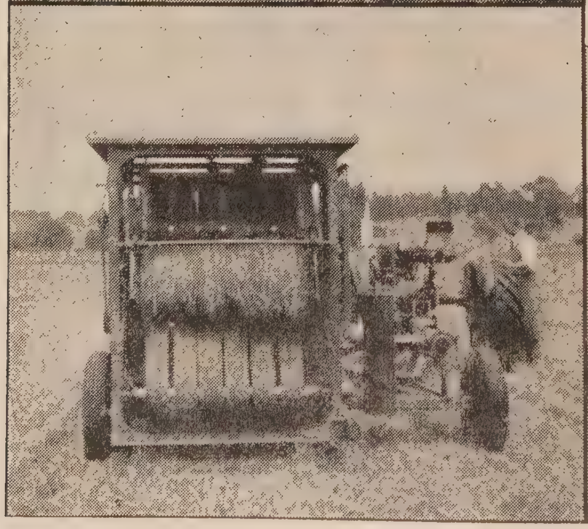
A Walk-through Bail for Handling Cattle


2ft. 9in.
3½in. x ½in. flat mild steel
4in. x 3in. rolled steel joist
2ft. 1in.
3in. x 1½in. channel
3in.
2in. x ½in. flat mild steel
3in. x 1½in. channel each side
8in.
2½in. x ¾in. flat mild steel links
4ft. 6in.
3in. x 1½in. channel
3½in. x ½in. flat mild steel
3in.
3in. x 1½in. channel
2ft. 6in.

Links and grip handle are secured to the shafts by suitable washers and split pins. The holding bar ends of links are packed flush with the rolled steel joist by pipe spacers.

New-type Machine Bales Hay in a Roll

By H. A. ARTHUR, Department of Agriculture, Timaru.



A HAY baler entirely different in operation from the conventional type is shown in the accompanying illustrations of a demonstration of the new machine on the property of Mr. W. H. Orbell, Levels, South Canterbury, during the 1947-48 harvest season. The hay is picked up from the windrow and passed up the conveyer into the machine, where it is rolled between forming bands into a light roll bound with ordinary twine; no knotter is used, and the bale is discharged through the back of the machine on to the ground. The whole action is entirely automatic, the only manpower required being that of the tractor driver.

Some of the advantages claimed by the manufacturers are that the hay travels in a continuous straight line, making for simplicity of design. The pick-up is wider at the mouth (6ft.) and reduces to 3ft., assuring a very neat, firm-ended bale. The hay is in a long mat, with all the leaf and most valuable fodder securely bound into the bale. The weight and density of the bales can be varied by a simple adjustment to give varying diameter of bales from 14 to 22in., with weights ranging from 40 to 100lb. The width of the bale remains constant at 36in.

Ordinary binder twine is used to tie the bales, and the amount required varies according to the diameter of bale and the number of turns per bale desired. The length used per bale ranges from 27 to 45ft., according to size of bale and number of turns. The average tonnage per 8lb. ball of twine varies from 3 to 4. The twine box holds 48lb. of twine. The output varies from 4 to 8 tons of hay per hour, according to crop, or 200 to 230 bales per hour regardless of weight of bales.

The power to operate the baler is delivered from the drawing tractor through the power take-off.

One of the advantages claimed for the round bale is that it is more impervious to water than the conventional bale. The stems of the hay plants are bent round and act as a natural shedder of water and prevent penetration. After a shower it is a simple matter to roll the bale over with the foot so that the weather side can get the drying effect of sun and wind.

To feed out hay the bale is rolled out on the ground, leaving a long mat of hay, and the length of twine can be gathered up. Alternatively the bale could be stood on its end and a stake driven through the centre, allowing stock to feed into it. Still another method would be to split the bale lengthwise with a hay knife and feed out the pieces.

It is understood that in the near future the makers of the machine are bringing out a specially-designed power circular saw which, fitted to the baler or lorry used in distributing the hay, cuts the bale very neatly, saving the manual labour of using the hay knife.

CULTURE of VIOLETS

PROBABLY few flowers have become so widely popular as the violet. Apart from having a special charm of its own, the violet is all the more acceptable because its flowering period occurs when few other garden subjects are in blossom. Its unusually-attractive scent is one of its chief assets, and it has proved a valuable commercial plant for the cut-flower trade. In this article T. Conway, Orchard Instructor, Department of Agriculture, Hastings, outlines the cultural methods necessary to provide a long period of prolific flowering of the modern violets.

THE violet was originally a woodland plant, but, as with many flowering and food plants, plant hybridists have improved greatly on the early types of violets which grew wild. Cultivated varieties succeed best when grown in open, sunny positions, thriving better than in the semi-shaded situations which are the natural environment of the wild sweet-scented violets.

Varieties

Violet varieties (or hybrids) available from nurserymen are usually not numerous, but with a little searching for sources of supply it is possible without much trouble to build up an interesting collection of high-class, modern violets or a representative range of the various coloured but usually smaller types.

Foremost among present-day commercial types of single (giant) dark-blue violets is Prince of Wales. When well grown, this variety has a strong stem about 10in. long and large, single flowers about 1in. across, with a very attractive scent. If grown in an open, sunny position, it blooms freely for about 5 months of the year, from May to September, in favourable localities. For best results replanting of the bed every second year or so is advisable.

Another good blue variety which flowers about the same period is Winston. Its growth and flower size are similar to those of Prince of Wales, but it develops an attractive rosetting of the petals at the centre, of a mauve to blue shading. Princess Mary is a somewhat similar type, with considerable merit for floral work.

King of the Doubles may be classed as one of the real double varieties. Though very large, it is not especially attractive, except for its remarkably-strong and sweet scent. It has a background of purplish-blue petals with an overriding central cluster, or rosette, of blue, purple, and white mottled petals.

Selection of Site

Though predominantly a spring-flowering plant, the violet can be induced to flower during winter in favourable localities by judicious treatment. For commercial cut flowers this is important, as market prices are best during this period.

For the production of violets in large quantities for commercial purposes they should be planted about 9in. apart in rows not closer than 12in. Spacing of the rows will depend on the type of cultivating equipment to be used. For early flowering the selection of an area of land with a northerly and sunny aspect is advisable, and the soil needs to be a good-quality silt loam. If the site is cooler or more shaded, receiving little morning and midday sunshine, the blooming period will be much later. Plantings made under both conditions will extend considerably the period over which flowers will be available.

Propagation

New plants for further or extended plantings can be provided in at least three ways: The young runners which arise from and become rooted alongside the parent plants in an established bed can be used; strong, old crowns can be broken up and the more vigorous and well-rooted sections replanted; or cuttings may be taken from material in established beds, preferably from vigorous runners. As best results are achieved with young strong plants, the material used for propagation should be selected carefully, whichever method is adopted.

Plants raised from cuttings are usually the most satisfactory. The cuttings should be taken from healthy runners during August and September, and after the foliage has been trimmed lightly and the stem of each cut just below a node (or leaf axil), they should be planted in a cold frame, in a glasshouse, or in a well-worked and firm bed in a sheltered and semi-shaded area of the garden. Care must be taken that the cuttings do not lack moisture during the striking period, particularly if the weather is warm and dry. By March or April the cuttings will have made a good rooting system, and they can be replanted into a prepared area to grow on for flowering in the following spring. As the plants strengthen they will develop many runners, but these should be removed carefully to maintain the vigour of the parent plants for prolific flowering during the second year.

After two years' flowering the plants may be destroyed and the bed prepared for replanting. Younger beds should have been prepared in the meantime to ensure a continuity of flower production.

Renewal of Beds

Various methods can be adopted for the renewal of beds. One method is to allow a limited number of runners (about 2 per plant) to remain in an established bed during the first year after planting out; these develop into strong-rooted plants, which can be lifted in the autumn and replanted in newly-prepared areas for the subsequent 2 years' flowering. Alternatively, they can be left alongside the parent plants for the first season of flowering and transferred to new quarters in the late spring after they have flowered.

Periodic preparation of cuttings for transplanting into new beds is another method of maintaining vigorous young flowering beds.

In the preparation of new beds, particularly where violets have been removed recently, ample attention to soil fertility and soil humus is essential before the beds are replanted.

Treatment of Established Beds

Periodic attention to established beds is important and should not be overlooked, as may easily happen after a bed has passed its first flowering period. As the violet was originally a woodland plant, it is naturally used to a cool and moist root area. Therefore, if established beds pass through hot and dry conditions during summer without ample moisture, plants cannot develop strongly for the subsequent flowering season. Some system of irrigation, preferably overhead sprinkling, is advisable to ensure violets passing through the summer in good condition. The success of commercial plantings depends greatly on this.

Mulching between the rows with well-rotted manure, straw, or compost during October and November not only conserves moisture in the soil during summer, but also adds valuable humus to the soil.

Control of Pests

Violets are subject to attack by red spider and thrips, which are likely to infect them fairly severely during the growing period, when healthy foliage is important in strengthening the plants for the following season. The best method of controlling these pests is to spray the plants at monthly intervals from November to March with summer oil at a dilution of 1 gallon to 100 gallons of water, plus 1½ pints of nicotine sulphate. When thrips are present 2lb. of 25 per cent. D.D.T. to 100 gallons is recommended to replace the nicotine sulphate in combination with the oil, as D.D.T. gives effective control of thrips.

If favourable weather encourages a heavy infestation of red spider and thrips, spraying at shorter intervals may be necessary. Thorough spray coverage of the under-sides of the leaves is important.

Keys to Success

Commercial plantings of violets will repay a grower for the extra care in the treatment given to them. Success in their culture depends on the following main points:—

Planting in good-quality soil in an open, sunny situation, preferably on a northerly slope for early flowering; a sunny position will also ensure prolific flowering.

Regular replanting to keep the plants young and vigorous.

Regular mulching, irrigating, and spraying of the beds, especially during summer. Though violets flower more freely when grown in the full sunshine, more mulching and watering is required than when plants are grown in semi-shaded situations.

REWAREWA A VALUABLE SOURCE OF NECTAR

By C. R. PATERSON, Apiary Instructor, Department of Agriculture, Hamilton.

REWAREWA *(Knightia excelsa)*, a native of New Zealand, is of considerable value to the beekeeping industry as a secondary source of nectar. The surplus honey produced from this source assists materially in the total production of honey in the North Island during favourable seasons, but, like many other nectar-producing trees in this country, rewarewa has its off seasons when very few flowers are produced. The timber of this tree is much prized by wood craftsmen.

REWAREWA or native honeysuckle, as it is often called, is fairly well distributed throughout the open bushlands of the North Island and parts of Marlborough Sounds in the South Island. It can be picked out readily from the other native flora by its resemblance in shape to the familiar Lombardy poplar. It attains a height of between 60 and 90ft. and a trunk up to 3ft. in diameter.

On the Mamaku Ranges between Hamilton and Rotorua clumps of rewarewa with their dark-green foliage can be seen against a background of the predominant tawa trees. Most of the trees near the roadside are comparatively young, having come away after milling of the area.

From Tauranga to Waihi through Katikati rewarewas show up prominently on hillsides that were swept by fire many years ago, and the hills between Waihi and Whangamata are also well studded with these graceful trees.

From a distance the brownish-red flowers on the rewarewa are inconspicuous and the casual passer-by may never notice them, but closer examination reveals the beauty of their prominent clusters.

Value to Beekeepers

The rewarewa begins flowering about October and continues into December, according to location, but unfortunately, like the rest of the nectar-bearing native trees, it yields nectar spasmodically. It was of very little value to the beekeeper during the past season, but there are seasons when it yields nectar copiously, and on many occasions nectar may be seen dripping down from the trees, when beekeepers secure very good crops. The honey extracts fairly well, and though it is dark to blood red when in liquid condition, it appears to meet with a steady demand by those who have taken a liking to its characteristic mild flavour.

Although beekeepers close to large areas of rewarewa sometimes secure very good crops, it must be remembered that the trees, because of their limited distribution and spasmodic flowering, can be classed only as a secondary source of nectar, and it would be risky for beekeepers to depend entirely on them for their main crop.

Value as Timber

Its beautifully-grained wood, with great variation in grain according to the cut of the log, makes rewarewa a most suitable timber for fancy woodwork, and it is most popular with woodturners and craftsmen in wood. It is not generally used by cabinetmakers, though occasionally pieces of furniture are made from it.

Rewarewa trees near the coast above Whangamata in Thames County.

PRODUCING IMMUNITY OF STOCK FROM DISEASES

Wise Use of Vaccines and Sound Feeding and Management Methods

By A. G. BRASH, Veterinarian,
Department of Agriculture, Christchurch.

OF all methods of disease prevention none perhaps appeals to the farmer more than immunisation by the use of vaccines. No doubt its simplicity adds to the appeal, as often a single injection is sufficient to give lifelong immunity. Among the most brilliant achievements of modern veterinary science has been the gradual development of new methods of producing immunity. Some may be disappointed that the list of diseases against which artificial protection is available is not a longer one, but stock losses could be reduced if full use were made of the vaccines now available.

VETERINARIANS and Inspectors of Stock of the Livestock Division of the Department of Agriculture will give advice on the use of vaccines when required. If necessary, they will also demonstrate the methods of adminstering those vaccines which are available for use by the farmer himself.

Success in the prevention of disease does not, of course, lie in the use of vaccines alone. Artificial immunisation plays its part in only a small number of diseases. The remarkable results often obtained with biological products must not cause the nutritional and hygienic aspect of disease prevention to be overlooked.

Poor nutrition generally tends to break down the natural barriers of the animal against disease. The reverse effect of good nutrition is clearly illustrated in the case of parasitic trouble in calves and lambs, where adequate feeding of the young animals gives them a chance to acquire the immunity which develops with age. The effectiveness of the contagious abortion vaccine will also be increased if prompt hygienic measures are adopted, such as the disposal of the aborted foetus or the isolation for 2 or 3 weeks of cows or heifers which have aborted.

The aim of the livestock owner should be to help his animals by the wise use of vaccines and by sound methods of feeding and management to acquire sufficient immunity to resist disease infection.

In its true sense immunity denotes complete resistance to a disease, but as all individuals can seldom be made resistant enough to withstand severe exposure, the term is used chiefly in a relative sense. It does not necessarily mean absolute resistance, but signifies that the natural resistance of the animal has been increased.

Natural and Acquired Immunity

Natural immunity is a condition which may be possessed by all the members of a species or breed or by an individual. It is a condition which is born with the animal or is inherited from its parent and does not depend on a previous attack or upon vaccination. For example, sheep are fairly immune to tuberculosis and fowls are immune to tetanus. In most outbreaks of infectious disease there are some animals which show a natural resistance and do not develop symptoms. Other factors operate in resistance, chief of which are the severity of exposure and the virulence of the bacteria or virus causing the infection. Resistance is therefore a complex problem and natural immunity may be broken down in many instances by severe exposure.

Acquired immunity is the type which in normal circumstances usually follows an attack of disease. It may also be conferred artificially by inoculation or vaccination. Sometimes when the mother has been subject to an attack of a disease during pregnancy an animal may be born with immunity to that disease. In some cases the protective anti-bodies are passed from the mother to the young animal in the colostrum. This is the case in enterotoxaemia when vaccination of the ewe causes anti-bodies which protect the

HEADING PHOTOGRAPH: With good pastures providing ample feed in spring and early summer, and silage, a greenfeed crop, and hay as autumn and winter supplements, stock on this Norsewood, Hawke's Bay, farm are on the high plane of nutrition that assures maximum resistance to disease.

Hay & Silage

saved this farmer

£450

Here is clear proof that the provision of adequate, good-quality hay and silage pays handsomely. This example was recently quoted by the Technical Officer to the N.Z. Dairy Board's Herd Recording Department from material collected by the Board's Consulting Officers in the course of their work and contained in their diaries.

The owner of a highly-efficient dairying unit in the Waikato makes no secret of the fact that one of his main concerns is the provision of ample supplementary feed for his herd. There is no doubt that this policy is a worthwhile one, for although it necessitates more work, often more worry, and better than average managerial ability during the spring and summer months, once the extra area has been safely harvested either as hay or silage, the seasons of possible and probable feed shortage can be faced with confidence.

Food reserves on this farm at the beginning of May were estimated at 1 ton of hay plus 2½ tons of silage per cow—and this was considered inadequate by the owner. The question may well be asked, "Do results on this farm justify a policy necessitating so much extra work and worry?" An examination of the production on this farm during the disastrous drought season of 1945-46 should provide an answer. The tested herds in his area dropped in production by an average of 76lb. fat per cow when compared with the previous season. The fall in production on this farm amounted to only 5lb. per cow. The herd in that year comprised 64 cows, so at current prices the value of production, which could to a large extent be attributed to the saving of liberal amounts of hay and silage, amounted to approximately £450.

There is no doubt that the extra butterfat could well be utilised by a hungry Europe. It is up to the individual farmer to decide whether this form of insurance against sub-normal feed-growing conditions is preferable to such drastic measures as herd reduction and premature drying-off of the herd.

BETTER FARM MANAGEMENT

means more production

WHERE BRITAIN STANDS WE STAND

ISSUED BY THE AID FOR BRITAIN NATIONAL COUNCIL lamb for several weeks after birth to be passed in the colostrum.

Acquired immunity may be **active or passive.** If the animal produces its own anti-bodies, an active immunity results. Active immunity may be set up as a result of a recovery from a natural attack of the disease or by artificial inoculation with living or dead bacteria or their toxins. This type of immunity is never acquired suddenly, but once it has been acquired it generally lasts for a considerable period. After vaccination the immunity takes several weeks to develop, and during that time the animal is still susceptible.

Immunity is not developed in every bacterial disease, but if an animal develops a strong resistance after a natural attack, an effective vaccine can generally be produced against that disease. An example is distemper in dogs. If, on the other hand, no strong immunity is produced after a natural attack, it is likely to be difficult to produce an effective vaccine. For example, cows are subject to recurrent attacks of mastitis, against which no reliable vaccine has yet been produced.

If the resistance of an animal is increased by the injection of anti-bodies produced in another animal, the immunity is known as passive. The injection of such an anti-serum confers immunity immediately, but unfortunately it lasts only a short time. An example is canine distemper anti-serum, which can be used for the treatment of distemper or to give temporary immunity for 2 or 3 weeks when dogs are likely to be exposed to infection.

Vaccination

The term vaccination was first used to describe the inoculation of human beings against smallpox with vaccinia, the virus which causes cowpox. This method was first introduced by Dr. Edward Jenner in 1796, and to him belongs the credit of exploiting the use of an attenuated virus for the production of active immunity. The term vaccine was originally restricted to the lymph used to vaccinate against smallpox. Pasteur applied the principle to the prevention of bacterial infections. The term vaccine has come to be used in a general sense for any bacterium or virus, fully virulent, attenuated, or dead which is used for conferring an active immunity. The reduction of virulence is accomplished by subjecting the organism to heat or drying or other unfavourable influences strong enough to weaken but not to destroy it. In some cases an organism modified in virulence is used for immunising purposes, as for instance in contagious abortion. The term bacterin is commonly used to describe a vaccine prepared with the use of dead bacteria. Where the harmful effects of bacteria are due to the toxin or poison which they produce, the vaccine may consist of the toxin modified by chemical treatment and called a toxoid. This type of vaccine is used in producing immunity against tetanus.

Function of Vaccination

The object of vaccination is to induce in the animal a reaction, sometimes a mild form of the disease, which stimulates the body to develop anti-bodies against the infective agent. The presence of infection is not always the only cause of a diseased condition; in most cases the combined effects of various contributing factors are necessary. Immediately after the invasion of the infective agent the protective mechanism of the body is set in motion and the disease results only if the attack is stronger than the defence; that is, if the animal is not capable of producing sufficient anti-bodies. Lack of proper feed, exposure to cold, overwork, or travelling stock over long distances, especially in bad weather, are influences that tend to weaken the normal defences of the body. Chronic infections such as foot-rot in sheep may lower resistance. Parasitic infection will also predispose an animal to infection. Sometimes a disease devitalises the body and prepares it for attack by the invading germs of a secondary infection. This often happens with canine distemper, when dogs weakened by the distemper virus succumb a few days later to a secondary infection such as pneumonia.

The mechanism of defence against disease is a very complex one and a great variety of anti-bodies are produced by the body cells in response to vaccination. Sometimes the anti-bodies act by neutralising the poison produced by the invading organisms, in which case they are called anti-toxins; or the anti-bodies may act in numerous ways against the bacteria themselves; for example, by causing them to group together (agglutination), when they are more readily destroyed by the phagocytic cells of the body.

A short description follows of the more important diseases in an impressive list against which vaccines can be used in New Zealand.

Distemper in Dogs

The vaccination of dogs against distemper is very effective and the man who values his dog will not neglect to have it done. Dogs should be vaccinated as soon as possible after the age of 3 months, but they may be done at any time after that age. All the data so far collected on the results of vaccination indicate that it is unusual for a vaccinated dog to develop distemper. Two injections are given, the method being to inject the live distemper virus and a few hours later a dose of distemper anti-serum. This gives the dog an active, and usually a lifelong, immunity against distemper, the same as it would develop after a natural attack of the disease.

An injection of distemper anti-serum by itself will not produce an active immunity, but it does produce a passive immunity which will last for 2 or 3 weeks. It is useful for giving protection to dogs which may be exposed to infection. Thus, if distemper breaks out in a pack, injection of the unaffected dogs will give them immediate protection. It is also used for the treatment of distemper, but to be of any value in this respect it must be used in the early stages of infection.

Vaccination against distemper is carried out only by veterinary surgeons and veterinary practitioners. Dog owners may, however, obtain the distemper anti-serum to be kept on hand for immediate use if an outbreak of distemper occurs, and this is particularly useful in areas where veterinary assistance is not readily obtainable.

Scabby Mouth of Sheep

Scabby mouth (contagious ecthyma) is another virus disease which affects mainly lambs or young sheep. Older sheep may be affected if they have not previously been exposed to infection. The lambs may infect the udders of the ewes. Scabby mouth may cause a considerable setback in condition, particularly in fattening lambs. On properties where it has occurred previously use should be made of the vaccine which is available free from the Department of Agriculture's Animal Research Station, Wallaceville, or through any Veterinarian or Inspector of Stock. Lambs may be conveniently vaccinated at marking time.

Blackleg in Sheep

Blackleg in sheep appears to have become more prevalent in recent years. In sheep the blackleg organism (*Clos-*

[*Sparrow Industrial Pictures Ltd. photo.*

The immunity against parasitic troubles which calves and lambs develop with age is dependent on adequate feeding.

The organism which causes blackleg disease in sheep usually gains entry through an injury, and losses may occur after shearing, dipping, lambing, or marking. As there is a high percentage of deaths among animals affected with the disease, great care should be exercised in handling sheep during these seasonal operations.

tridium chauvoei) usually gains entrance through an injury, and losses may occur after lambing, shearing, dipping, or marking. There is a high percentage of deaths among sheep affected by the disease, which causes swelling and discoloration of the affected area. The affected muscles when cut have a darkened appearance and contain gas and blood-stained fluid. Blackleg in sheep belongs to the type of infection popularly called blood poisoning, and farmers should report losses of this type so that a diagnosis can be made and vaccination carried out to prevent further deaths. The blackleg vaccine is very effective, and on farms where losses occur regularly it is the only practical means of prevention.

Blackleg in Calves

Blackleg in calves differs from the same disease in sheep in that infection may take place through the food, and cases develop in young cattle up to 2 years without any history of injury. Young calves in good condition are the most common victims. The most notable symptom is the development of a characteristic swelling underneath the skin of the affected quarter, in which case the calf will be very lame. This is a scheduled disease under the Stock Act and each case must be reported to the local Stock Inspector so that adequate steps may be taken to carry out the necessary control measures. Its distribution in New Zealand is confined to certain areas of the North Island. It thus differs from blackleg in sheep, which is widely distributed in both the North and South Islands. Vaccination is a very effective preventive.

Black Disease

Black disease is a very acute disease of sheep which is associated with liver fluke infestation in some areas. It is caused by a spore-forming organism of the gas gangrene group (*Clostridium oedematiens*). The spores may be present in the liver of perfectly-healthy sheep, but they develop and multiply only when damage is produced by flukes. A small area of dead tissue is produced in the liver in which the organisms multiply further, producing a powerful toxin which kills the sheep within a few hours. Black disease does not occur in all fluke-infested areas, and in New Zealand it is confined to Hawke's Bay. A very effective vaccine for the prevention of black disease is available. Vaccination carried out in November and December gives immunity before the usual appearance of the disease in the autumn.

Tetanus (Lockjaw)

Tetanus is caused by the toxin produced by the organism *Clostridium tetani*. This germ, in common with others in the same group, grows best in the absence of air, and tetanus is most likely to follow a deep wound, such as a stake or nail prick wound in a horse. It may also occur after lamb marking, shearing, or any other wound condition. As the toxin travels from the wound along the nerves stiffness and paralysis are produced. Contraction of the muscles causes the jaws to be locked together, the animal being unable to eat. The third eyelid also protrudes from the inner angle of the eye. Symptoms may not appear until several weeks after infection, and if the wound was a small, punctured one, difficulty may be experienced in locating it. Tetanus can be prevented by vaccination with tetanus toxoid. A lasting immunity develops approximately 2 weeks after the injection. The effectiveness of the vaccine is shown by the fact that after the inoculation of all servicemen in the Second World War cases of tetanus were practically non-existent. The cost of the vaccine is very small, and it is well worth while vaccinating susceptible animals in areas where tetanus is known to occur. For the protection of wounded animals which have not been vaccinated tetanus anti-toxin may be injected. This gives a passive immunity which lasts for about 2 weeks. Large doses of anti-toxin are also used for the treatment of tetanus. Treatment, however, is usually not successful, and preventive inoculation is preferred.

Enterotoxaemia (Pulpy Kidney)

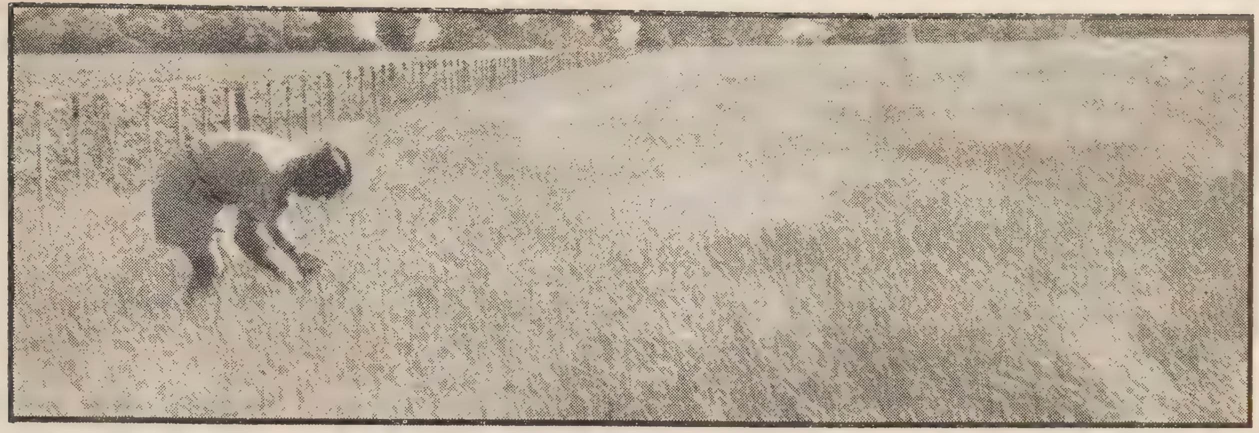
Vaccination against enterotoxaemia or pulpy kidney disease was first introduced in 1935 and has proved to be the most practical means of control. It is seldom possible to control this disease by management alone. Enterotoxaemia, as the name implies, is caused by the absorption from the bowel of a toxin, produced in this case by the organism *Clostridium welchii*, type D. The effect of vaccination is to cause the formation of an anti-toxin in the blood. If the greatest losses are in lambs up to 4 weeks old, the usual method is to vaccinate the ewes. This is done twice —at about 6 weeks and 2 weeks before lambing. If the ewes have been vaccinated the previous season, one dose about a fortnight before lambing is sufficient. The anti-toxin is passed on to the lamb in the colostrum or first milk. The immunity produced in the lamb in this way disappears in a few weeks. Vaccination of the ewes should certainly be considered where the average annual loss from enterotoxaemia in young lambs is much over 2 per cent. Losses sometimes occur in older lambs, hoggets, or adult sheep. These are usually seasonal and it is difficult to predict when vaccination will be warranted. If it is usual to lose lambs over 6 weeks old, it is convenient to vaccinate at marking time.

Anthrax

Fortunately the serious disease anthrax has occurred to only a very limited extent in New Zealand and the few outbreaks have been brought under immediate control by vaccination. Vaccination against anthrax is very reliable, and it was on this disease that Pasteur carried out his classical experiments on protective inoculation in 1881. The fact that the spores of anthrax may live for many years makes continued vaccination necessary in infected areas.

Contagious Abortion

The introduction to New Zealand in 1941 of a successful vaccine against contagious abortion was of great importance to the dairying industry. Since that time the number of calves vaccinated annually has rapidly increased and most farmers are now well aware of the value of the vaccine. A reduction in the number of abortions from nearly 20 per cent. in non-vaccinated to less than 3 per cent. in vaccinated heifers has been achieved. The vaccine used is Strain 19, which was first developed in America. This is a less-virulent strain of *Brucella abortus*, the germ which causes contagious abortion. Vaccination of calves after the age of 4 months has been shown to provide a satisfactory immunity for at least the first three calvings. The incidence of the disease in dairying districts is high and vaccination of calves is a wise precaution, even in herds where contagious abortion has not yet occurred.



Research into Blind Seed Disease of Ryegrass

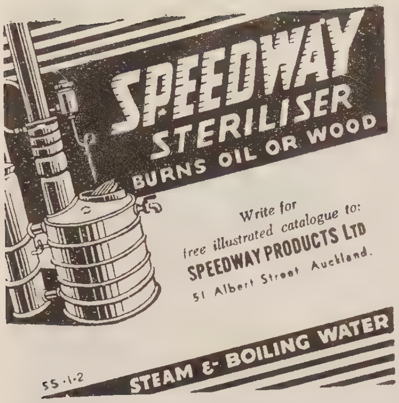
THE production of small seeds has assumed an important place in New Zealand's farming economy. Ryegrass seed production is easily the most important section of the industry, and the widespread occurrence of blind seed disease of ryegrass has been an obstacle to its development. Considerable research has been concentrated on this problem during the past decade, and in 1941 research workers investigating the disease met for the first time in Wellington as an informal Blind Seed Disease Committee. The objectives of the committee were solely the exchange of information and the co-ordination of work. At the annual meetings of the committee are representatives of the Grasslands Division, Plant Chemistry Laboratory, and Plant Diseases Division of the Department of Scientific and Industrial Research, Canterbury Agricultural College, and the Extension Division (including the Seed-testing Station) of the Department of Agriculture. This article outlines the research work being carried out by those institutions and is the outcome of the recent meeting of the Blind Seed Disease Committee.

IT was in 1932 that the major cause of widespread low germination of ryegrass seed crops was first attributed to a fungus, *Phialea temulenta*. Since then considerable data have been collected about blind seed disease, both in New Zealand and overseas. The pioneer work was carried out by Hyde and Neill, working at the Seed-testing Station, Palmerston North, and at the Plant Diseases Division, Auckland, respectively. These two institutions have been in the forefront of the fight against the disease, and progress has been watched eagerly not only in New Zealand but also by research workers and farmers in many other countries.

The Grasslands Division has taken a major part in blind seed disease research. The more prolific and highly-productive strains of ryegrasses produced by the plant breeders of the division have been found to be highly susceptible to the disease; that fact presents a problem of great significance to plant breeders and farmers alike.

Early investigational work at this research station involved field trials of a general nature, manurial trials with various fertilisers, and sowing and management trials. However, as more detailed experimental work became necessary it was essential to have available a more reliable means of spreading the disease among the trial plots than occurs in a normal season. Artificial inoculation techniques were developed, by means of which each plant or flower head is infected with disease spores. Both the Grasslands and the Plant Diseases Divisions have been involved in this work, and a satisfactory and reliable technique is now in widespread use.

Under suitable weather conditions perennial ryegrass seed crops, such as that in the upper illustration, are liable to severe attack by blind seed disease. Under ordinary conditions Italian ryegrass, a heavy crop of which is shown in the lower illustration, is much less susceptible, but it may be attacked in some seasons.



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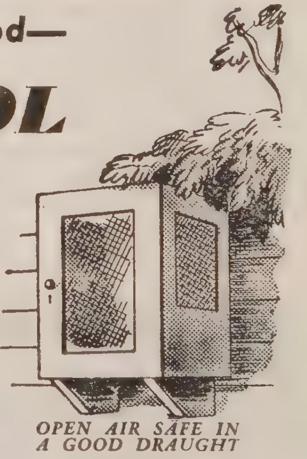
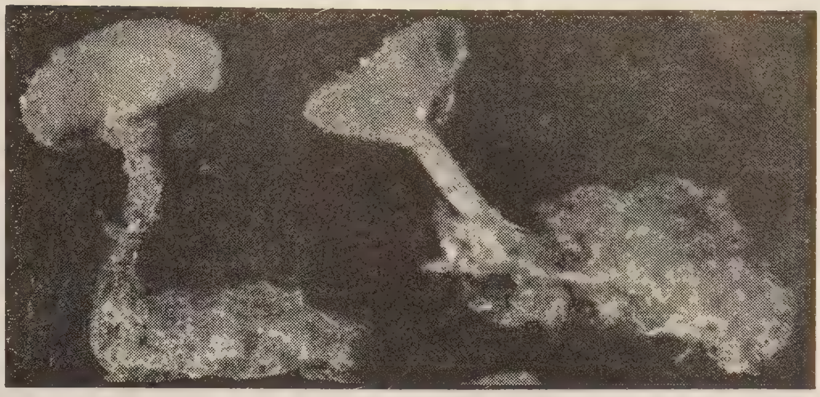
Housewives—the warmth of the kitchen or dining room shelf encourages germ growth and invites trouble. Use an ice box in summer time if you have no refrigerator.

KEEP FOOD COOL AND BE SAFE

This is another of a series of advertisements issued by the Department of Health in the interests of safe and clean food handling. FH4



OPEN AIR SAFE IN A GOOD DRAUGHT



Apothecia, a mushroom-like stage of the fungus which discharge the disease spores that infect the seed crop, developing from old, infected ryegrass seeds taken from the soil surface.

Marked differences in the susceptibility to the fungus disease of different ryegrass strains were recognised a few years ago, and immediately steps were taken to investigate this aspect of the problem. Originally, natural old pasture lines of ryegrass from Southland had proved more resistant or, rather, of higher germination than the Certified strains. These were tested under artificial inoculation technique, and again proved to be more resistant or less susceptible and of higher germinating capacity. From this point breeding work was undertaken, and again assumptions were proved correct, in that resistance (or susceptibility) was found to be an inherited character. In plants produced by crossing resistant parents, disease infection even under artificial inoculation occurred to less than half the extent of that in the progeny from susceptible plant crosses. However, the resistant plants are very inferior to Certified strains in production and in many other characters of major importance to farmers.

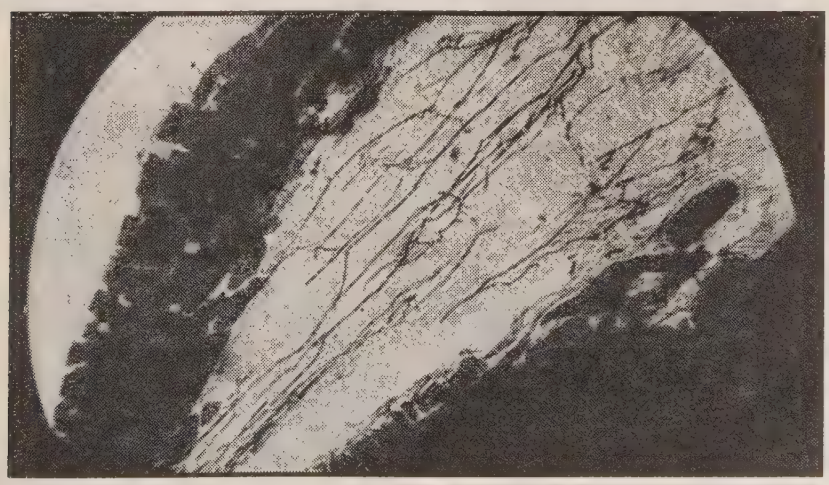
Consequently the work carried out has been in the direction of attempting to combine the resistance character with the other valuable characters of Certified strains by breeding. This work is long term, and only by patient and persevering breeding and research will it be possible to produce the desired plant—one that has production equal to the best Certified strains but also is resistant to blind seed disease.

The procedure so far adhered to includes the selection of suitable resistant plants; crossing these with the highly-productive pedigree strain and selecting resistant plants of improved type; testing these, and repeating the process many times until the hoped-for combination is obtained in a line that breeds pure to type and resistant to blind seed disease. It is far too early to forecast the outcome of this breeding experiment, but results so far obtained are promising.

Another feature of the problem, which is being investigated and bears some relation to the breeding work described, is the question of whether different strains of the fungus are present in different localities in New Zealand. If that were the case, resistant lines bred at Palmerston North may not be resistant in Southland. To test this assumption, composite samples of disease spores are used for artificial inoculation on all occasions, and specimen resistant plants are being grown throughout the country under observation and test for germination and blind seed disease.

The programme of research described applies to perennial ryegrass. The Italian and short-rotation ryegrasses have also proved susceptible under artificial inoculation, though in most seasons they have lower incidence of blind seed in the field, which may be accounted for by the shorter period between flowering and ripening and later flowering under drier conditions. Less investigational work has been carried out on these ryegrasses, but preliminary work is now being undertaken by the Grasslands Division.

Additional research is also being carried out on the effect of soil fertility and plane of nutrition on susceptibility of ryegrass to blind seed disease. Pot experiments have been conducted with soils low in fertility to which plant nutrients have been added. Results as yet are inconclusive, though there is some evidence that in the field ryegrass growing vigorously is less affected by the disease than unthrifty ryegrass.



A longitudinal section of a perennial ryegrass ovary at flowering, showing the fungus threads (hyphae) travelling toward the developing embryo. (Magnified 175 times.)

The Grasslands Division has also carried out extensive crop management studies, which have given many leads toward obtaining some control of the disease. Early closing of paddocks, increasing density and lodging, and obtaining a good white clover bottom growth were all found to improve the germination of the resulting seed crop. Certain fungicides and therapeutants have also been investigated for disease control under field conditions, and nitrogenous manures have given successful results in the Manawatu district under trial.

At Canterbury Agricultural College, Lincoln, the blind seed disease programme has been integrated in the co-operative research organisation. Pre-harvest testing at Lincoln has supplemented the wider service of the Seed-testing Station, and field top-dressing and management trials have given results in accord with those reported by the Grasslands Division. The main objective of the current trials at the college is to demonstrate the possibility of securing high germination or freedom from disease in ryegrass crops by using at the outset disease-free seed (hot water treated) sown on areas where some degree of isolation from air-borne secondary infections is achieved by choosing special seed-production areas surrounded by barrier non-susceptible crops.

The Plant Diseases Division, Auckland, in recent years has been concentrating on the mycological aspects of the fungus disease. Artificial inoculations and fungicidal and therapeutant control form the basis of the investigations. Recent work has revealed several interesting features of the life cycle of the fungus. One of these is the great rapidity with which the disease spreads, given ideal conditions, which depend on temperature and humidity. A relatively-low temperature (between 50 and 60 degrees F.) and higher humidities (up to 100 per

A dense bottom of white clover in a ryegrass crop tends to reduce infection by the blind seed disease organism.

cent.) are ideal, and field trials in Auckland have failed because normal temperatures during seed setting are too high for rapid spread of the disease. Glasshouse conditions under complete control are therefore used for all experiments. Climatic conditions, chiefly temperature and rainfall, are the primary factors in the incidence of the disease in the field, and these factors probably account for the higher losses in southern districts, where temperatures approximate the optimum in November and December.

The Department of Agriculture has always recognised the vital importance of the seed industry and the losses involved in the spread of blind seed disease. Its Seed-testing Station provides a testing service for farmers whereby samples of ryegrass seed heads can be checked for the amount of infection before the ryegrass is harvested. Farmers have been not only assisted considerably in their harvesting programme but also safeguarded against financial loss.

Pre-harvest testing for blind seed disease involves the examination of seeds from reasonably-mature seed heads under a microscope for estimation of damage to the developing seeds by the blind seed fungus. Representative samples are collected from the paddocks by the farmer and, on receipt at special testing stations organised at Christchurch and Timaru during the harvest season, are examined by trained staff from the Seed-testing Station. The farmer is advised of the extent of the disease infection and the maturity of the sample tested. From this information he can judge whether the crop is worth harvesting for seed or should be cut for hay, whether cutting should be delayed for the taking of a white clover crop, and which crops deserve attention first.

A comparison of the past 2 years' testing is interesting, in that the 1947-48 season was dry and germinations were very satisfactory, but the previous year high germination was very difficult to obtain. Farmers were not overworried by blind seed disease during 1947-48, when only 724 samples were tested; in 1946-47 4117 samples were examined.

The Fields Division (now the Extension Division) has carried out extensive trials in the seed-producing districts. Surveys have been made and general data collected, and the work is continuing. Certification statistics have been analysed and many different aspects put to test in trials and surveys. The outcome of this work, though far from conclusive, has largely confirmed the results of investigations by the Grasslands Division. It would appear that improved sward density, a good bottom growth of clovers, and heavily-yielding crops are all associated with improved germination in the resulting seed crop. Heavy crops, even if lodged, in general appear to have better germination than thin, upright crops, and nitrogenous fertilisers, which in some cases bring about heavy, lodged crops, have had the effect of reducing the incidence of disease in the seed. However, all these factors are much less important than seasonal conditions, and consequently results are frequently difficult to interpret. Humid conditions, especially during flowering, in most cases will bring a heavy incidence of blind seed disease, regardless of the other factors mentioned.

For the pre-harvest examination carried out by the Department of Agriculture a small sheaf of seed heads such as this should be collected from various parts of the paddock.

At present field work is being carried on with nitrogenous manures, fungicides and therapeutants, and crop management studies. A survey of all certification areas will be undertaken during the coming season, and all areas will be inspected for collection of data on such important points as the condition of the crop, lodging, bottom growth, previous history, and weather records.

Wide Field of Research

Research on blind seed disease covers an extensive field and is being carried out by a large number of workers in New Zealand. In England, Scotland, Ireland, and Oregon, U.S.A., the problem has also become of major importance to farmers and is being investigated energetically by agricultural scientists and extension officers.

In New Zealand, in the long-term field, faith is being placed on breeding resistant strains, but as little is known of the cause of or reason for this so-called resistance, a prediction of the result of this programme would be unwise. In the meantime extensive work is being carried out on other methods of attack. The resources and staffs of the Departments of Agriculture and Scientific and Industrial Research are concentrating on the problem and giving it the attention it merits.

Flower Gardeners should Develop their Powers of Observation

[News-Photo Service photo.

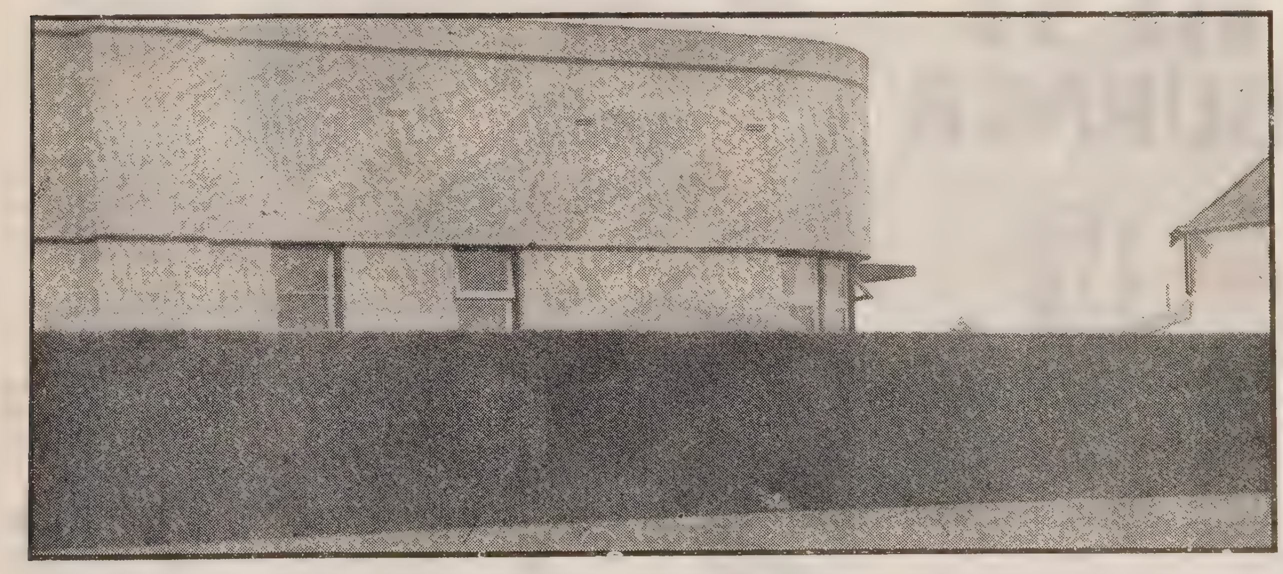
Conifers of various growth forms can be used to build up an attractive and artistic picture. They are especially suitable for use around homes built in the modern style, such as this bungalow in Havelock North, Hawke's Bay.

THE need for gardeners to be observant, especially in noticing and controlling the attacks of pests on flowers before they have become disfiguring, is stressed in these reminders about work to be done during January. J. P. Hudson, formerly of the Horticulture Division, Department of Agriculture, Wellington, points out that in the hot summer months some pests can increase very rapidly and undo much of the good work that the gardener did earlier in the season.

BULB-PLANTING season will soon be here again. Now is the time to consider what to buy and to place an order for new bulbs before the best have all been sold. Bulbs bought beforehand should be kept in a cool, dry place until they are needed for planting in February, March, or later, according to district.

Chrysanthemums should now be growing strongly. When they have developed their full branching systems each plant or clump should be circled with a strong tie that will give it adequate support and prevent summer gales from blowing out any of the side branches. Late varieties should be stopped for the second time, the tip being pinched out from each shoot to encourage it to branch again.

Composts for seed sowing and potting work can be made up at home by most gardeners, following strictly the instructions given in the July, 1947, issue, However, buying these composts ready prepared is easier, and a number of nurserymen and seedsmen are now selling seed-sowing and potting composts correctly made up to the John Innes prescriptions. Gardeners who need only small quantities of compost for a few pots or boxes will find it well worth while to buy compost rather than use ordinary garden soil.



[N. W. Deverell photo.

Though this olearia hedge is in excellent condition, the predominance of horizontal lines should have been broken by the judicious use of trees. For instance, a silver birch and an Italian cypress would alter the whole landscape picture, yet would not become too big or throw too much shade.

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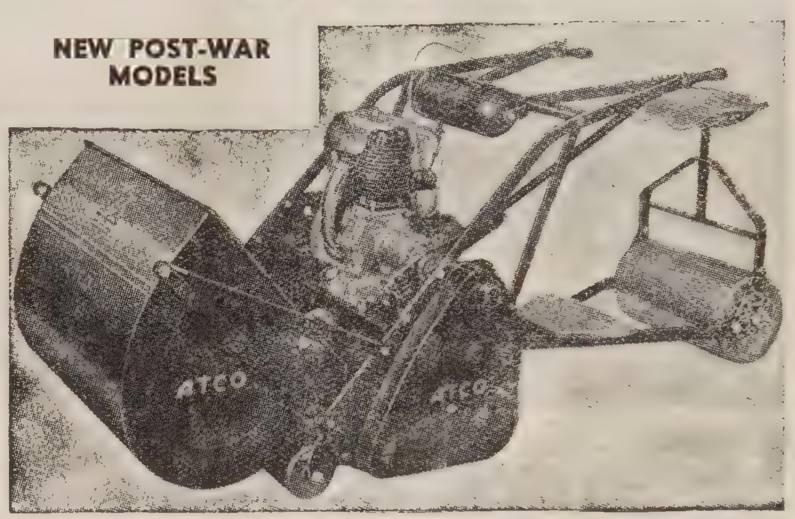

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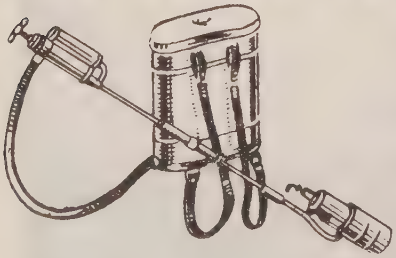

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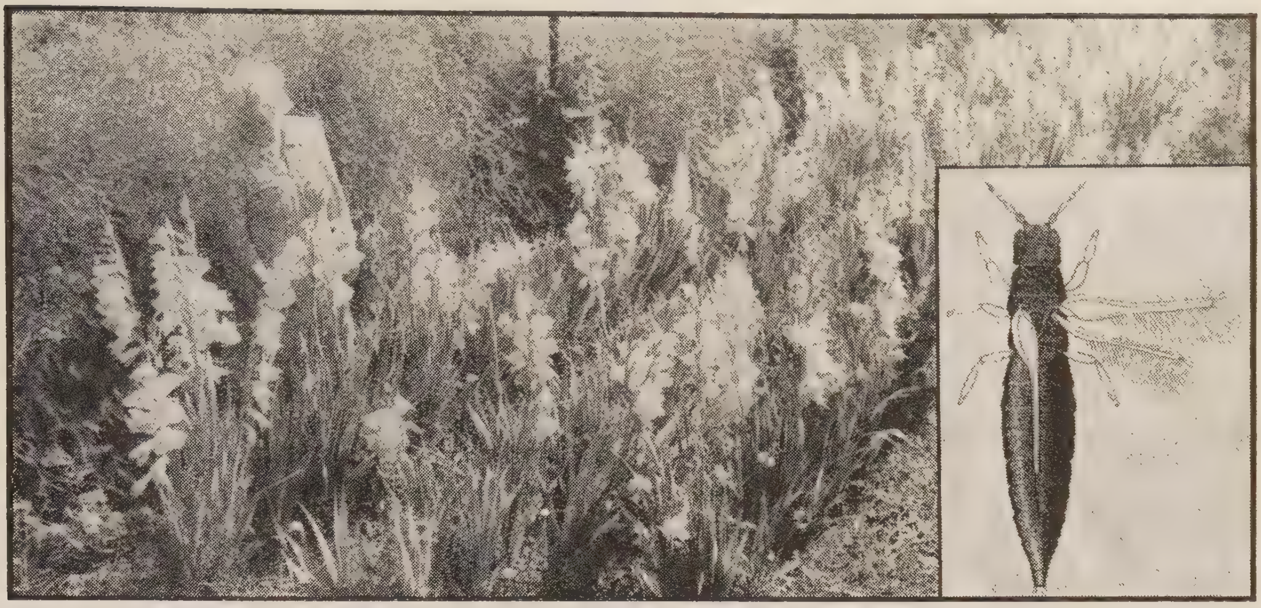
WORK IN THE FLOWER GARDEN



[*Photo News Ltd. photo.*

Leaves and flowers of gladioli should be searched carefully for thrips at frequent intervals and steps taken to control this pest if it becomes troublesome. Nicotine sulphate and summer (white) oil emulsion or D.D.T. will control thrips, and even heavy syringing or hosing with plain water will reduce the pest. The thrips (inset) are small, active insects with slender, elongated bodies up to 1/10in. long when fully grown, and range in colour from yellow to brown or black. The immature insects run about on leaves or flowers and adults fly with curious fringed wings.

Cyclamen, easily the most useful winter-flowering pot plants, should be used much more often to decorate the house in the duller months. Though cyclamen are not hard to grow, raising really good plants from seed is not easy unless a glasshouse is available, and the plants have to be grown for about 18 months after seed sowing before they are in full flower. Householders are recommended to buy cyclamen as plants in full flower in winter, enjoy them until spring, and then gradually dry off the plants as described in earlier issues of these notes. After the plants have been rested each should be started off again into growth by knocking the ball of soil out of its pot, removing the soil gently from the corm, and repotting the corm into a smaller pot. The John Innes potting compost is suitable, preferably with a liberal amount of crushed brick mixed with it to counteract the silty nature of much New Zealand soil. The pot must also be well supplied with broken crocks to ensure proper drainage. The corm is usually only half buried in the soil, and sprinkling a pinch of green sulphur over the centre of the corm is worth while to reduce the risk of its rotting. The pots should then be stood in a cool, shady place and watered to encourage them to start to grow. Cyclamen which have been dried off only recently need not be started into growth until later in the new year.

Dahlias do not usually need disbudding unless they are being grown for exhibition, in which case side shoots and side buds should be removed to throw all the energies of the plant into developing a few very large flower heads. New shoots coming from the ground at this time of the year can be thinned out or removed. Frequent removal of spent flower heads is most important to ensure a succession of new flowers, but inexperienced gardeners sometimes confuse new, unopened buds with those which have flowered. After the petals fade and fall they leave a green, pointed structure that looks not unlike a bud at first sight, but it is soft and open and differs in many respects from an unopened bud; it provides a simple test of the powers of observation that are important to the gardener. Spray with nicotine sulphate and white oil emulsion—½ fl. oz. of nicotine sulphate and 3 fl. oz. of summer (white) oil emulsion in 2 gallons of water—if thrips or red spider are observed on dahlias, or dust with D.D.T. if only thrips are observed. Water dahlias thoroughly if the ground is dry, as a continuous supply of water is needed to keep them growing and flowering through the dry summer months.

Geraniums should be gone over carefully at the first sign of rust, affected leaves being picked off and burnt to prevent spread of the disease. The plants should then be treated with a spray containing 2 fl. oz. of lime sulphur and ½ fl. oz. of colloidal sulphur to 2 gallons of water. The ivy-leaved geraniums should be more widely grown, both because they are not attacked by rust and because they are fine, free-flowering plants, specially suitable for trailing over walls or low banks. Some of the white geraniums are so susceptible to rust that they are better not grown at all, as they serve only to infect others, whereas some double red varieties seem almost immune from attack and have the added advantage that the flowers stay bright even after the petals fade and need not be picked off, as they do not set seed. Geraniums are such useful, showy plants that some trouble is worth while to find varieties more or less immune from rust and concentrate on growing them, building up a good stock by means of cuttings.

Herbaceous perennials and other plants growing in the mixed flower borders should be staked securely as soon as necessary. Various systems of staking can be used (several were described in detail in the January, 1948, issue), but whichever system is followed, the criterion of good staking is a garden undamaged after a gale, yet with very few strings or stakes showing. Plants like lilies, with massive and heavy flower heads, will usually grow unsupported at first, but must be staked at latest by the time the flower buds can be seen.

Hollyhocks are unique in the strength and height of their flower stalks and can be used effectively to make a feature near the house to break the monotony of a bare wall or corner. Plants are best raised anew each year from seed sown in early summer. Young plants are less liable to attack by rust disease than old ones because infection persists from year to year in and around the old stool, whereas seedlings are free from the disease when first raised. If the typical brown spots of rust appear on hollyhock leaves, spray at once with the sulphur sprays recommended for geraniums, but if the plants are near a painted wall, which would be discoloured by the sulphur sprays, protect the wall temporarily with newspapers before spraying and spray carefully to avoid spotting the paintwork.

Lawns should now be dressed with a poison bait to destroy the young caterpillars (subterranean grass caterpillars) of porina moths before they have time to harm the grass. The bait is made by mixing thoroughly 1½ to 2lb. of bran, oatmeal, or similar material with 1oz. of paris green (a poisonous arsenical compound) or 2oz. of arsenate of lead (also highly poisonous), then moistening the mixture to a crumbly consistency with water, to which a little treacle may be added to make the bait more attractive. If it is made too wet, the bait will be lumpy and impossible to spread evenly. Spread this quantity of bait thinly over about 1500 sq. ft. of lawn, taking care not to leave lumps of bait undistributed. A good kill of caterpillars should result, though there will be little evidence to show this until autumn, when the lawn should remain green all over instead of developing bare patches. New lawns are best sown in March on soil that has been thoroughly consolidated. Now is not too early to start preparing the area to be sown later by forking over the soil (if that has not already been done) and then walking over it repeatedly to make sure that it is all evenly compacted; "heeling" is the gardener's term for this process, in which all the weight of the body is brought down on the heel to press and firm the soil. After being trodden, the surface soil should be loosened with a hoe or rake, but the firmer soil below should not be disturbed again before sowing.

Warning Against Use of Native Flora for Decoration

[*T. W. Collins photo.*

THE use of native species is frequently regarded as an easy and effective way of decorating grounds and the outsides of premises, and the Christmas holiday period usually brings a renewal of interest in such displays. However attractive they may be, the leaves of nikau palms, pungas, and other native species must not be used for such purposes; it is an offence against the law to use the native flora in this way.

Plants to Propagate this Month to Ensure a Garden Full of Flowers

Budding of roses can be started as soon as the bark lifts freely.

Cuttings can now be taken of many plants, including flowering shrubs, fuchsias (see May, 1947, issue), lavender, catmint, sweet williams, antirrhinums (a good way of increasing plants of specially-good colours), geraniums, and many alpine and rock garden plants. Where possible, young new side shoots 2 or 3in. long should be torn gently from the main stems, with a heel (small piece) from the side of the parent stem still attached. In the case of geraniums and sweet williams the tips of new shoots make the best cuttings. In most cases rooting hormones make the cuttings root more rapidly and freely, but they have little effect on the more difficult species which are normally harder to root. In all cases cuttings will root better if put in a cold frame with the light kept closed and the cuttings and soil damped over to maintain a moist atmosphere for the first few days.

Layer border carnations (illustrated in the December, 1947, issue) and keep the soil moist around plants on which earlier layers were taken.

Lift, divide, and replant peonies, bearded irises, and pyrethrums when their main displays of flowers are over. Plants newly set out in summer need plenty of water until they are re-established.

Plant out pot marigolds (calendulas) and gaillardias from boxes, and also any rooted cuttings still left in the frame. Plants set out in January need careful watering until they are well established. Also plant out autumn crocus, *Iris reticulata,* meadow saffron, nerines, and other interesting bulbs that flower in autumn.

Prick out cinerarias, polyanthus, primulas, and other young plants from seedlings sown in November and December. Where relatively-small numbers of plants are to be dealt with it is best to prick them out into boxes of seed-sowing compost. Wallflower seedlings should also be pricked out into boxes or, more usually, lined out in some odd part of the garden 4in. apart in rows about 12in. apart. A few more boxes of self-sown flower seedlings such as cinerarias, antirrhinums, and pot marigolds should also be pricked out if any of these are noticed growing in the borders. The plants will be useful later.

Sow wallflowers (in warm northern districts), early (winter-flowering) sweet peas, a few annuals for autumn planting in warm districts, and Iceland poppies. All those are best sown in boxes, kept in a cool, shady place until the seedlings appear.

Sow, Plant, or Propagate Something Every Month

Mulch flower borders with coarsely-sieved compost if any is available. A dressing of compost applied now has a remarkable effect on the condition of the soil for the rest of the season and is a great help to all plants in the mixed flower border. The easiest way of sieving compost is to use an old wire mattress propped up at an angle and throw the compost on to it. Large pieces of unrotted material that will not go through should be put on to the current compost heap to continue rotting, and material that goes through can be spread at once on the borders.

Peonies are colourful and showy herbaceous plants, flowering in early summer, which are not grown nearly often enough in home gardens. Once established they should not be moved more often than necessary, as they often take a season or two to recover, but old, overgrown clumps which have not been divided for a number of years are best divided in early new year, when they finish flowering. Lift each clump carefully, remove the soil, cut the fleshy roots into a number of pieces, each with a crown, but without mutilating them more than necessary, and then replant the pieces at once.

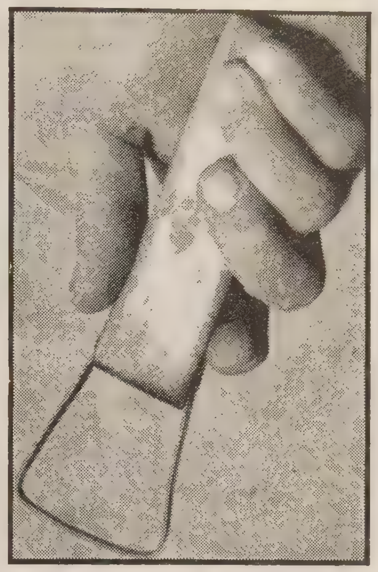
Pot on any pot plants that need it, as shown by the tests described last month, and continue feeding pot plants which are in full growth. Though the feed mixture frequently mentioned in these notes is quite satisfactory, the one recommended by the John Innes Horticultural Institute would be preferable. However, until recently potassium nitrate and mono-ammonium phosphate, two of the main ingredients of the John Innes feed, were not available readily in New Zealand, but it is understood that they are now coming on the market. The John Innes liquid feed for nearly all pot plants consists of 15 parts by weight of sulphate of ammonia, 2¾ parts of potassium nitrate, and 2¼ parts of mono-ammonium phosphate, used at the rate of ½ to 1oz. per gallon of water. Alternatively, the mixture can be made up with a carrier and applied dry at the rate of ½ to 1 teaspoonful per 5in. pot, but this dry feed mixture is better bought ready made up. Occasionally hold pot plants upside down under a running tap and allow the stream of water to wash off dust and insects from the leaves to keep them fresh. The force of water should be adjusted to the sturdiness of the plants, but many, such as palms, will appreciate the full force of the tap.

Roses should always be cut with long stems—a form of summer pruning. When the flowers fade and stems need removing, do not just break off the dead heads, but cut each stem back to where the highest strong side shoot is growing. Rambler roses should be pruned as soon as their flowers have faded; remove the stems that have flowered this season and tie in the long new shoots which should have grown from the base of each plant. If few or no new shoots have grown from the ground, the rose is probably of some other type (such as a climbing rose), in which case the main stems should not be removed.

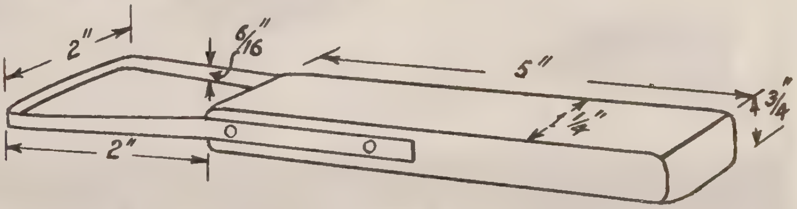
Spraying may become necessary on many ornamental plants at about this time of the year, when caterpillars begin to be troublesome. Observe all plants carefully, and at the first sign of small holes in their leaves or irregularly-nibbled edges spray with lead arsenate, 1¼oz. in 4 gallons of water, or apply a D.D.T. dust. Among the many plants liable to be attacked by caterpillars in summer are geraniums, calendulas, and sweet peas.

Sweet peas often do not receive much attention to their training in the later part of summer, when plants are allowed to "run wild." Dead flower heads must still be removed regularly or the plants will soon cease to flower. Where plants have been trained as cordons the stems can now be released from their supports, carefully laid along the foot of the row, and their tips trained to other canes, up which they will soon grow and produce another crop of flowers. Spray sweet peas with D.D.T. (1¼oz. of 25 per cent. wettable powder in 4 gallons of water) or dust them with D.D.T. dust at the first sign of thrips, or use the nicotine and summer (white) oil emulsion.

HANDY TOOL FOR WEEDING



A very handy tool for weeding the flower border can be made from a strip of thin steel (the strips used round bales of wool or packing cases are ideal) nailed to a wooden handle as shown here. The narrow blade goes easily through the soil, severing all weed seedlings just below the ground, yet there is no danger of garden plants being accidentally cut off, as in hoeing.



Topdressings are not usually needed in mixed flower borders where the complete flower border fertiliser was used in spring and a suitable mulch of compost has also been applied. However, where particularly fine flowers are required a topdressing of 1/3oz. each sulphate of ammonia and superphosphate per sq. yd. can be applied from time to time and watered in. If available, the John Innes feed is even more effective.

Watering, more than most tasks, is one that is worth doing well if it is done at all, as a sprinkling of water on the surface of the soil is quite useless, not helping the plants at all. If the ground is dry enough to warrant watering at all, it should be given a thorough soaking—sufficient to penetrate well down into the lower layers. For instance, 4 gallons of water per square yard (equal to 1in. of rainfall) should penetrate 10 to 12in. into the soil, provided it is not too dry beforehand, supplying the needs of most plants for about 2 weeks.

Other Work for the Month

Continue pinching off **dead flower heads** regularly and thoroughly every week.

Pot up a few **freesias** to be taken into the house in winter.

Cut **gladioli** spikes as the last flowers fade, but leave the leaves to complete their work.

Lift, divide, and replant old clumps of Christmas lilies (*Lilium candidum*).

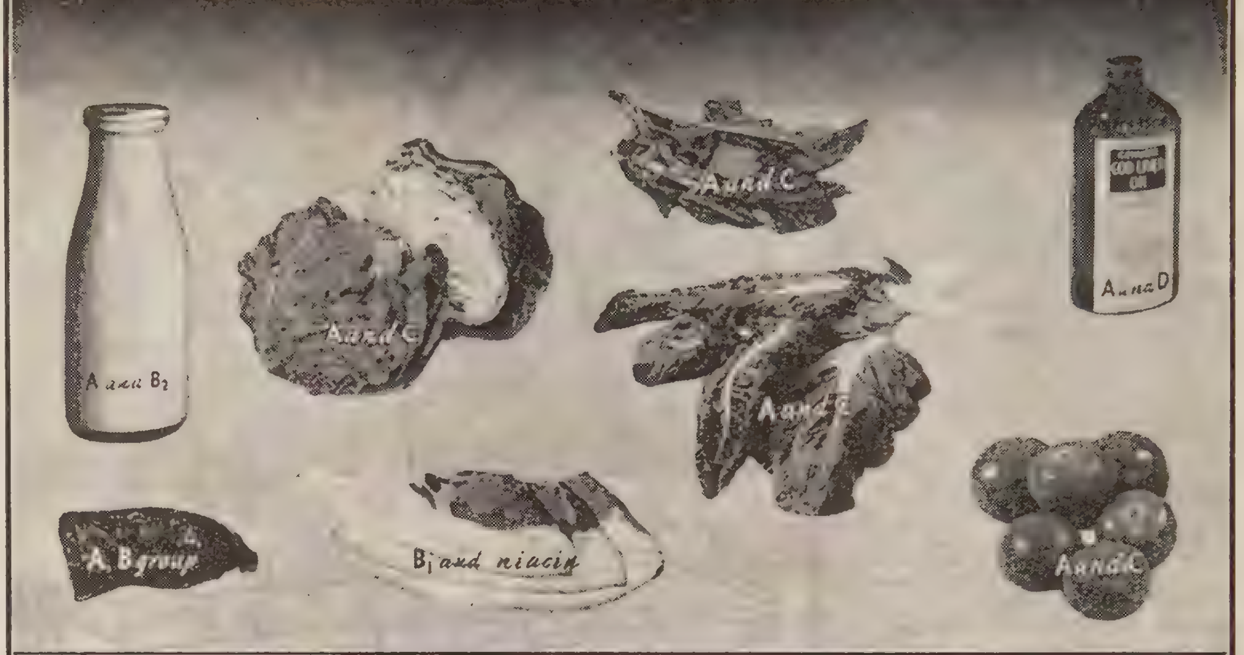
Cut back straggling plants of **violas** and **pansies** to encourage fresh growth.

[*Douglas Elliott photo.*

The Chatham Island forget-me-not *(Myosotidium hortensia (nobile))* is a very handsome blue-flowered plant for the mixed flower border if it can be given a cool, moist soil and semi-shaded position.

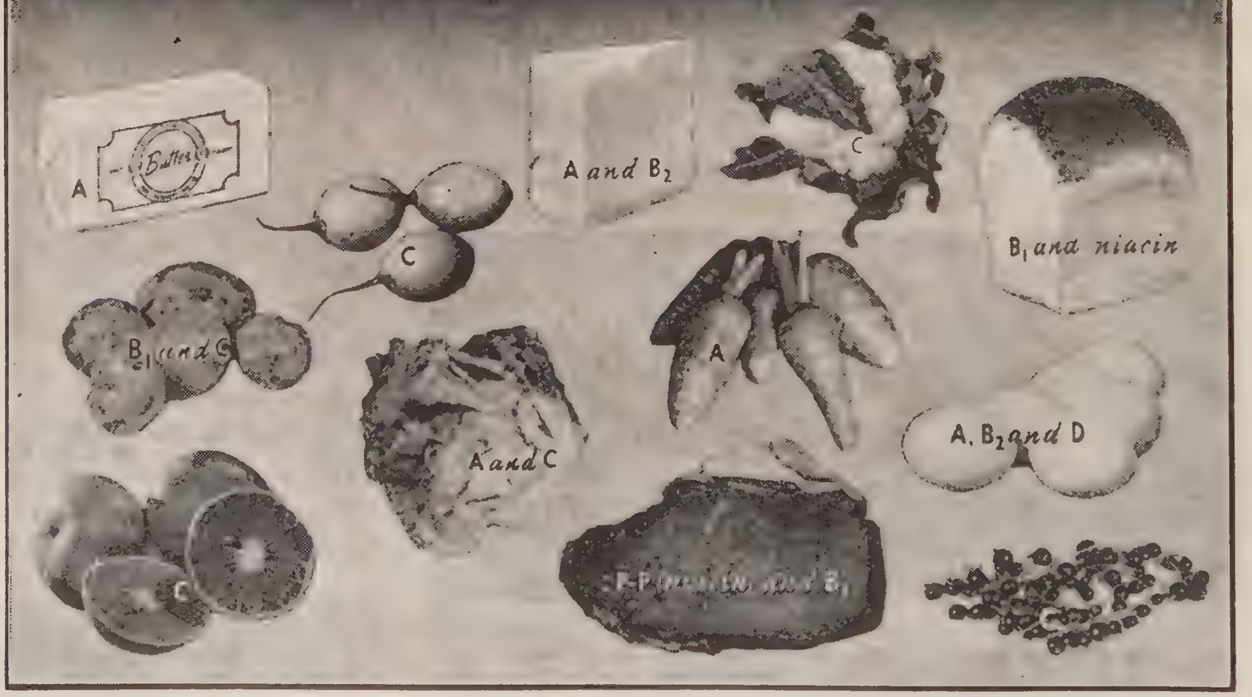
Foods containing Vitamins

VERY GOOD SOURCES OF TWO OR MORE VITAMINS


A and C
A and D
A and B_2
A and C
A and C
A, B group
B_1 and niacin
A and C

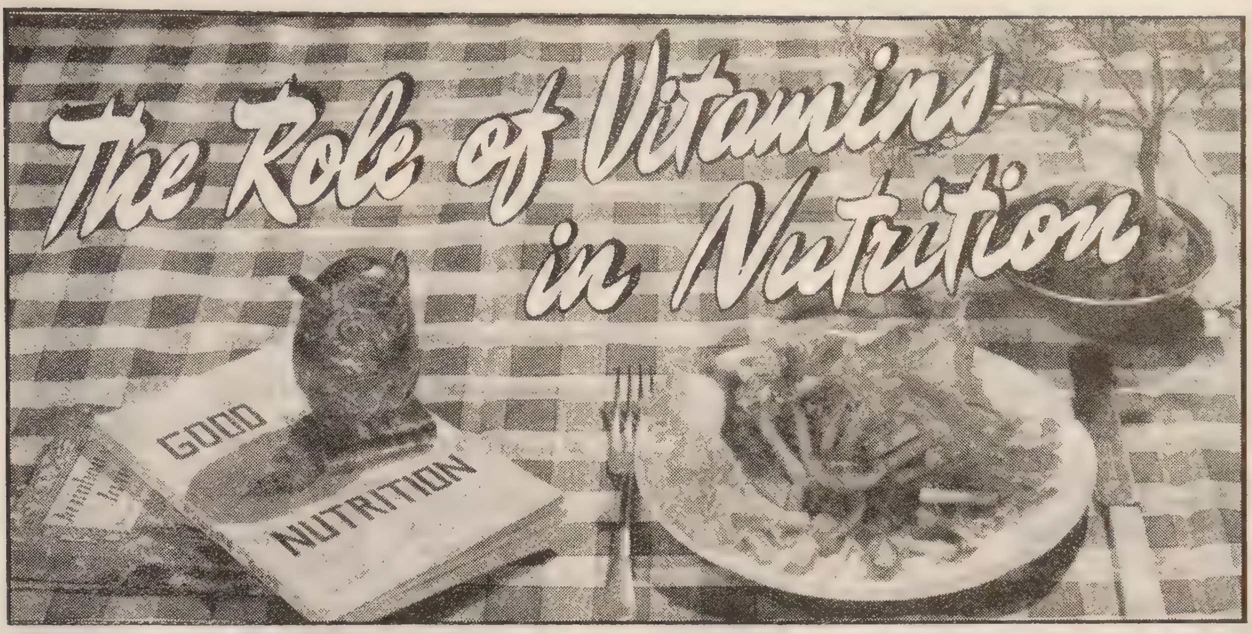
GOOD SOURCES OF ONE OR MORE VITAMINS

(A liberal serving provides at least a tenth of the daily requirement)


A
A and B_2
C
C
B_1 and niacin
B_1 and C
A
A and C
A, B_2 and D
C
P-P (niacin) and B_1
C

[Sparrow Industrial Pictures Ltd. photos.

The Role of Vitamins in Nutrition



[*Sparrow Industrial Pictures Ltd. photo.*

POSSIBLY the most dramatic chapter in the story of nutrition deals with the discovery and study of the group of body regulators called vitamins. As in all other branches of science, knowledge of nutrition has been advancing with ever-increasing momentum during the past 50 years. This advance, while partly the result of improvements in scientific apparatus and the processes of chemical analysis, has also been caused by the greatly-increased interest of scientists and doctors in the part food plays in the prevention of disease and the maintenance of good health. In this article Evelyn E. Moore, Rural Sociologist, Department of Agriculture, Auckland, recalls the history of the discovery of vitamins and describes the part they play in nutrition. Following articles will specify the functions of individual vitamins and the foods which are the best sources of each.

THE merit of being the first to investigate carefully the effect of different types of food on health and vigour belongs to a scientist named Majendie who, during the first quarter of the 19th century, introduced the experimental procedure of feeding to animals simplified diets of pure food constituents such as starch and fat and observing their effect on health and vitality. Though his knowledge of what constituted purity in the fat, sugar, starch, and protein which he fed to the animals was limited, he did show clearly that animals could not remain healthy for long on those substances alone, a fact which became the basis for the development of the modern theory of nutrition. Before the conclusion of these experiments the accepted theory, which had stood with little modification since the times of Hippocrates, was that only one nutritive substance or "aliment" was present in all foods, and that it was extracted during digestion by the digestive juices and was then able to provide the body with all that was necessary for life, provided sufficient food was eaten.

Curative Properties

Even after the publication of Majendie's experiments some time elapsed before the modern view that several kinds of nutrient substances are essential became generally accepted, and even longer before it was agreed that many of the substances present in foods in minute quantities—the minerals and vitamins—could have important effects on health, though from very early times it had been recognised that some foods had specific curative properties in certain diseases. For instance, even before the Christian era liver was known to be a specific remedy for night blindness, and in more recent times cod or seagull livers have been used by the natives of Newfoundland to cure this ailment, now known to be caused by vitamin A deficiency. The use of fresh fruits and vegetables as a cure for severe vitamin C deficiency (scurvy) has also been known for a comparatively-long time to at least a proportion of the medical profession, as in 1734 a scientist called Bachstrom positively asserted that "they alone are effective to preserve the body from this malady." However, the erroneous theories of the causes of disease and malnutrition made no provision for the fact that some foods could possess a greater nutritive value than others, and were so firmly entrenched in the minds of the authorities of that time that many more lives were lost before fresh fruits and vegetables were used habitually to cure scurvy. In fact, more than 100 years elapsed between the discovery that lime juice would prevent scurvy and the adoption of a regulation by the British Board of Trade that it should be administered regularly in all British ships. The general recognition of other vitamin deficiency diseases was equally slow, for only during this century has the vitamin-rich diet, possibly supplemented with the vitamin or vitamins markedly deficient in the previous diet, been the basis for the successful treatment of malnutrition.

The discovery of vitamins may also have helped materially in the spread of modern theories of good nutrition, as the adoption of new principles takes time unless a finding of dramatic importance to a specific disease occurs, and these findings are all quite recent. Vitamin C or ascorbic acid (its chemical name), the first of the vitamins to be isolated in a pure form, and then used to cure scurvy, was discovered only 15 years ago, and vitamin B, or thiamine, as a pure substance effective in the treatment of beriberi, was isolated 3 years later.

Another pure substance which cures pellagra (a very common disease in the southern States in U.S.A.) was discovered only 11 years ago. It is present in the mixture of vitamins in yeast extract, known originally as vitamin B, and is called niacin or nicotinic acid. Nicotinic acid had been discovered by chemists many years previously, but its identity as the pellagra-preventive vitamin was not established until 1938. In order that it might not be confused with nicotine—quite a different substance—it was later renamed niacin, though it is still called nicotinic acid by some nutrition workers. Folic acid, another of the B groups of vitamins, which is an adjunct in the treatment of pernicious anaemia, was discovered less than 2 years ago, and some of the vitamins at present being investigated are still to be isolated in pure form.

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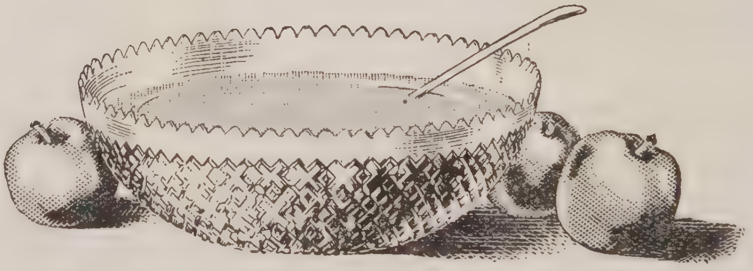

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Though the existence of special food factors apart from proteins, carbohydrates, fats, and minerals had been postulated by various scientists during the first half of the 19th century, not until 1912 did a scientist named Funk collect and evaluate the information then available in an article in which he introduced the term "vitamine." At that time the existence of two "vitamines" had been definitely proved, so the first to be discovered was called "fat-soluble A," because it was present in butterfat, and the second "water-soluble B," because it was present in water extracts of whole grains and yeast. Later scurvy was shown to be a deficiency disease, and the vitamin present in fresh fruits and vegetables which prevented it was called vitamin C, and the word vitamine was changed to its present form vitamin. Since then the existence of at least 13 other vitamins has been established.

Great interest was aroused in these new substances, and research workers all over the world became actively engaged in their isolation and purification. Thus, it often happened that the same vitamin was discovered by two people in different countries about the same time, and until it was definitely established that it was the same substance it frequently had two different names. When its chemical structure became known it would also be given a chemical name. For example, one vitamin of the B group now called riboflavin was known for some time as vitamin B_2 in England and as vitamin G in America. At present most vitamins have two or more names which are commonly used by nutrition writers, though as the chemical names become more widely known probably they only will be used.

The Body's Need for Vitamins

All living organisms need vitamins. Plants and some bacteria are able to manufacture their own vitamins, but animals must have most of theirs supplied ready made in the food they eat. These vitamins, like the minerals iron, iodine, and copper, are required by the body only in very small amounts, but the presence or absence of those small amounts in the food can make all the difference between health and disease. They also resemble those minerals in their effect on the body when consumed in excessively-large amounts, for then either trace elements or vitamins can have a harmful effect—in fact, the rule "moderation in all things" holds for vitamins too.

Unlike the minerals, however, vitamins are organic substances; that is, they all contain carbon and can be destroyed by heat, though the degree of their resistance to heat varies considerably. This instability to heat of some vitamins, particularly vitamin C, and therefore the tendency for a certain amount to be lost during cookery, makes advisable the eating of some fresh fruit or vegetables every day.

The fact that very small amounts of vitamins have an important effect on health naturally leads to the question: What do they do? Much still remains to be discovered about their exact functions in the body, though the role played by the B group of vitamins has been established fairly well. Just as a machine requires effective lubrication for its smooth and efficient functioning, and for minimising wear and the waste of fuel through friction, so the body needs vitamins for the efficient conversion of food into heat and energy. When they are deficient, food is neither efficiently nor completely utilised as fuel, and certain waste products, normally made harmless by the actions of the vitamins, accumulate so that the already-weakened body cells have even greater difficulty in functioning normally. In addition, food may not be so completely absorbed by weakened cells in the intestine, so that further waste occurs.

Other vitamins seem to be required more specifically for the maintenance of healthy tissues, for the promotion of ability to produce healthy offspring, and for the formation of normal bones and teeth. However, when several vitamins are required for the normal functioning of some parts of the body, as is usually the case, a lack of any one of them will suffice to inhibit this function, even though plenty of all the others are present in the food.

Effect on Health

Perhaps one of the reasons why the existence of vitamins was overlooked for many years was that the foods consumed by man usually provided enough of them to prevent the development of really serious epidemics of deficiency diseases. Most of his natural food contained some of several vitamins, the amounts depending mainly on the part of the animal or plant used for food and, especially in plants, on maturity and freshness. In an ordinary mixed diet these foods supplemented each other so that a full supply of vitamins was obtained, and only when the choice of foods was limited — on board ship, during droughts and famine, or in besieged cities—did severe epidemics of deficiency diseases occur.

Even then deaths from these causes were probably often far exceeded by those caused by famine or by epidemics of infectious diseases such as typhoid and smallpox which often raged unchecked at that time. The conquest of those diseases, and the greatly-increased use of refined foods such as highly-milled cereals in the diet, have tended to increase the proportion of illness caused by vitamin deficiencies, so that the cure and ultimate prevention of these deficiencies becomes of considerable importance to everyone interested in improving the health of the community.

Requirement of Vitamins

Just as the final objective in the study of such diseases as tuberculosis is their prevention, so the chief aim in the study of the vitamins is the promotion of the best possible health for everyone—a fact that should not be lost sight of in the maze of interesting scientific facts which research on vitamins has brought to light. Much of this research work has been carried on in an endeavour to find out just how much of each vitamin is required each day, not only to prevent the development of obvious symptoms of deficiency diseases, but to procure the best growth, health, and longevity.

One of the important results of this study has been to show that a diet consisting of a good selection of natural foodstuffs, such as vegetables, whole grains, milk, and other animal foods, contains all the nutrients necessary for health, and that though pure synthetic vitamins, vitamin concentrates, and specially - prepared vitamin - rich foods may play an important part in the treatment of vitamin-deficiency diseases and certain other ailments, they are not a satisfactory substitute for a normal well-balanced diet.

This study has also shown that the body's requirement of vitamins is comparable in some respects to its requirement of certain minerals. Another similarity is the wide margin between the amounts of both minerals and vitamins necesary to prevent disease and those which produce the best possible health and growth, for a two-fold or fourfold increase in the minimum allowance produces worthwhile results in better growth, vitality, and resistance to disease. However, increasing the intake beyond this amount appears to serve no useful function. Thus, while few New Zealanders have such a poor diet that they develop obvious deficiency diseases, probably many would benefit by a diet altered so that it had a higher content of one or more vitamins.

Chief Sources of Vitamins

In general the greater the variety of foodstuffs in a diet the more likely it is to be nutritionally adequate, and that is an important point in any discussion of the vitamin value of foods.

Though animals are unable to manufacture for themselves all the vitamins they require for health, and ultimately must rely on plants for their supply, that does not mean that plants are always the best sources of vitamins for man. Other animals obtain the vitamins from plants and concentrate them in the parts of their bodies where they are most needed, or in milk, so it follows that some animal foods are often better sources of some vitamins than plants. Nevertheless, plants still play an important part in a well-balanced diet.

As the vitamins are usually formed in the leaves of plants, green, leafy vegetables are good sources of most vitamins, as are the green, growing shoots. Seeds, including legumes, nuts, and grains, which store food for the young plant, are among the best sources of some of the B group vitamins if they are used unrefined. Root vegetables and fruits, on the average, are not as valuable sources of vitamins as green leafy vegetables, though exceptions do occur, including black currants, an excellent source of vitamin C, and carrots, which have a high vitamin A value.

Other important factors also determine the amounts of the different vitamins procurable from fruit and vegetables. These include the state in

ROLE OF VITAMINS IN NUTRITION . . .

which they are eaten (raw or cooked), the way in which they are cooked, freshness, the variety of plant grown, climate and season, and the degree of maturity or ripeness of the plants. How much these factors can affect the vitamin C content of the diet was shown by an experiment in which 65 English housewives participated at different times of the year. Research workers found that an average serving of cabbage could supply from 1/25 to 9/10 of the day's requirement of vitamin C, and potatoes from 1/30 to 1/3 of the day's requirement.

There are, however, some useful general rules for ensuring that the vegetables and fruits eaten contribute their full quota toward the daily requirement of vitamins.

1. Quickly-wilting leafy vegetables, such as silver beet, spinach, and lettuce, should be used as soon after picking as possible because the vitamin C is lost quite rapidly after they have been picked. Root vegetables and fruits which keep well lose their vitamins much less rapidly; in fact even after several weeks' storage their vitamin content may be practically unchanged.

2. If possible, prepare vegetables immediately before cooking them. Vitamins are lost into the water when they are left soaking for a long time.

3. Boiled vegetables should be cooked rapidly in a minimum quantity of water. Not only is the proportion of water-soluble vitamins lost into the cooking water greatly reduced, but it is easier to use the smaller amount of water in soups, gravies, and sauces.

4. Vitamins, especially vitamin C, are lost more rapidly while vegetables are being kept hot before serving than they are before cooking. Consequently, if the food value of vegetables is the most important factor to be considered, and the meal hour is uncertain, it is better to keep the family waiting 10 minutes while the vegetables cook than to keep the vegetables waiting for the family. That loss is probably most rapid in mashed potatoes, so that, especially if they are served frequently, appreciable amounts of vitamin C will be saved if they are mashed just before being served.

The animal foods such as milk, egg yolk, and meat (especially liver, kidney, and pork) are also good sources of some vitamins. They all contain one or more of the B group of vitamins in important amounts, and liver, egg yolk, and butter are good sources of vitamin A as well.

Vitamin Content of Diet

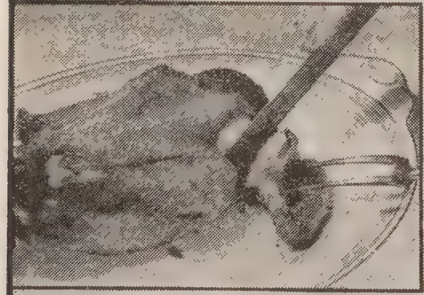
Probably the most practical general rule for increasing the vitamin content of the diet is to take larger amounts of whole milk, whole grains, fruits, and vegetables, as well as some butter, meat, and eggs. That also safeguards the mineral content of the diet, for many foods rich in vitamins are also good sources of minerals. For example, eggs and liver, good sources of protein, iron, and phosphorus, also contain appreciable amounts of vitamins A and B; vegetables, which are fair sources of most minerals, are generally excellent sources of vitamin C and some are also good sources of vitamins A and B.

Thus the daily menu which includes at least 1 pint of milk; 3 servings of vegetables; fresh fruit; eggs, meat, cheese or fish; the ration of butter, and mostly whole-grain cereals or bread should supply sufficient vitamins. Other foods will be needed to supply calories for growth and activity, but should not be allowed to replace any of the protective foods mentioned.

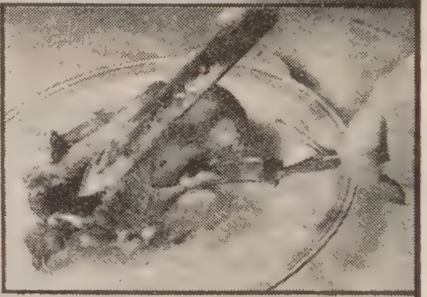
* * *

Carving the Christmas Poultry

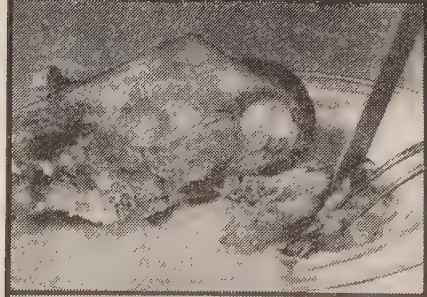
Neat and correct carving not only simplifies the task but also is less wasteful of the bird than if it were cut up in an unskilful way. A poultry carver or a pointed kitchen knife is most suitable, but whatever is used it should be really sharp, as easy and good carving is impossible with a blunt knife. The guard of the carving fork should always be kept up in case the knife slips.



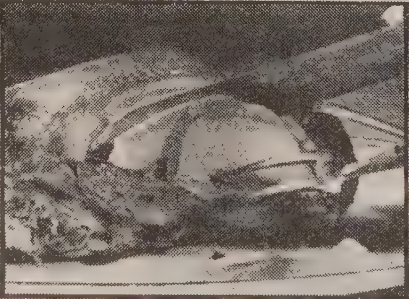
1. REMOVE THE WING. Hold the pinion firmly with the fork, cut through the lower edge of the breast, and feel for the wing joint. Ease wing away from body and cut through the joint.



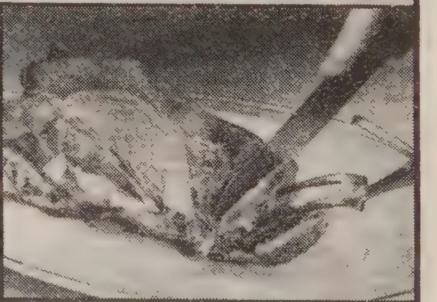
2. REMOVE THE LEG. Steady the bird with the flat of the knife against the breast, insert the fork between breast and drumstick, pull outward, and cut through the thigh joint.



3. DIVIDE THE LEG. Cut through the joint between drumstick and thigh bone. If the bird is large, the thigh may be divided again by cutting off part of the meat on the thick side.



4. CARVE THE BREAST. Steady the bird with the fork in the lower part. Hold the knife straight and cut the meat in long, clean, thin slices, parallel with the breast bone.



5. CUT THE STUFFING. Slice it from the front of the breast until it is level with the shoulders. Serve any stuffing which remains in the bird by scooping it out with a spoon.

STANDARD SIZES mean SIMPLER SHOPPING

THREE trends have made the subject of garment sizing important at present: Increasing amounts of clothing are being factory made and bought ready to wear; most home dressmaking is done with the aid of the popular paper patterns which can be bought in many styles; and the present-day fashion is for clothing which follows the natural lines of the figure, so that correct fit in both under and outer garments is most important for appearance and comfort. This article by Norma K. Metson, Rural Sociologist, Department of Agriculture, Wellington, describes work which has been in progress for many years in Britain and the United States of America to improve the unsatisfactory situation in garment sizing. The results of this work are now being used in New Zealand by the Standards Institute to establish a comprehensive set of lingerie sizes.

WHEN bulky gowns, crinoline frames, and such contrivances were worn, underwear was similarly ornate, and before the introduction of elastic and flexible knitted fabrics adjustments to size were made by means of tapes and drawstrings. Most garments literally "fitted where they touched." Now wearers demand really accurate fitting, and that can be achieved only by having available a wide range of different-sized garments, cut to conform to various figure types, and clearly labelled so that sizes can be identified at a glance.

Not a Simple Problem

Though the shopper may feel that a solution should be simple and merely a matter of applying common sense, there are many complications. There is the problem of determining a range of standard sizes which will give a satisfactory fit to the greatest number; a simple method must be found for selecting the correct size for any woman; and clothing manufacturers, who work in hundreds of small units, many of them highly specialised, must be persuaded to adopt the accepted size ranges and to make and mark garments in accordance with them.

The terms used at present, such as s.s.w., w.x., and o.s. for women and ages for children, are unsatisfactory for several reasons. Each manufacturer appears to use his own set of measurements, and an s.w., w., and o.s. of three different brands may all fit the same person. The measurements may be out of date, for people on the whole are taller and heavier than they were a generation ago, or based on the wrong proportions, because until recently there has been no statistical information about the actual (as distinct from the imagined or ideal) sizes and shapes of women and children. Wrong quantities have been manufactured—too many "average" sizes, with too little attention paid to the needs of those who require smaller or larger sizes. Using an age system for children is particularly unsatisfactory, as children of the same age may vary greatly in physical development. Different systems and ranges are used for underwear, frocks, coats, and costumes.

The Americans in their two studies of body measurements accomplished a very accurate and painstaking piece of work, during which they took 55 measurements of each of some 15,000 women and 130,000 girls and boys aged 4 to 17. From these measurements they were able to work out satisfactory dimensions for standard figure sizes, leading to the construction of a series of models which manufacturers are agreeing to use for their basic sizes.

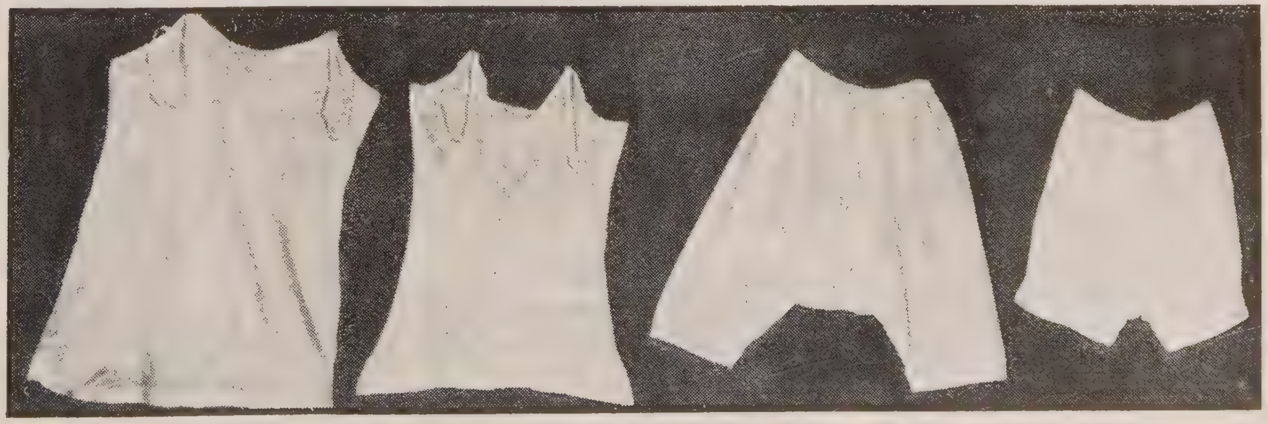
It was found that to select the appropriate size for a person two measurements were required, one vertical (for example, height) to determine the length of the garment, and another of girth (for example, bust or hip measurement) or weight for fixing the horizontal measurements. A single measurement is not adequate, because height and girth are not correlated. Women with a bust measurement of 32in. have almost exactly the same average height as those with a bust of 44in. Similarly, knowing that a woman is 5ft. 4in. tall tells nothing about her bust measurement, which may be 30in. or 50in.

Theoretically a combination of height and weight is the most satisfactory indicator, but it presents some practical difficulties, so suggested standards for women's garments were based on height and bust measurement and for children on height and hip girth. If these two measurements are known for an individual, sufficiently accurate predictions can be made for the others, such as arm length, waist size, and neck size, to enable a satisfactory selection of size to be made.

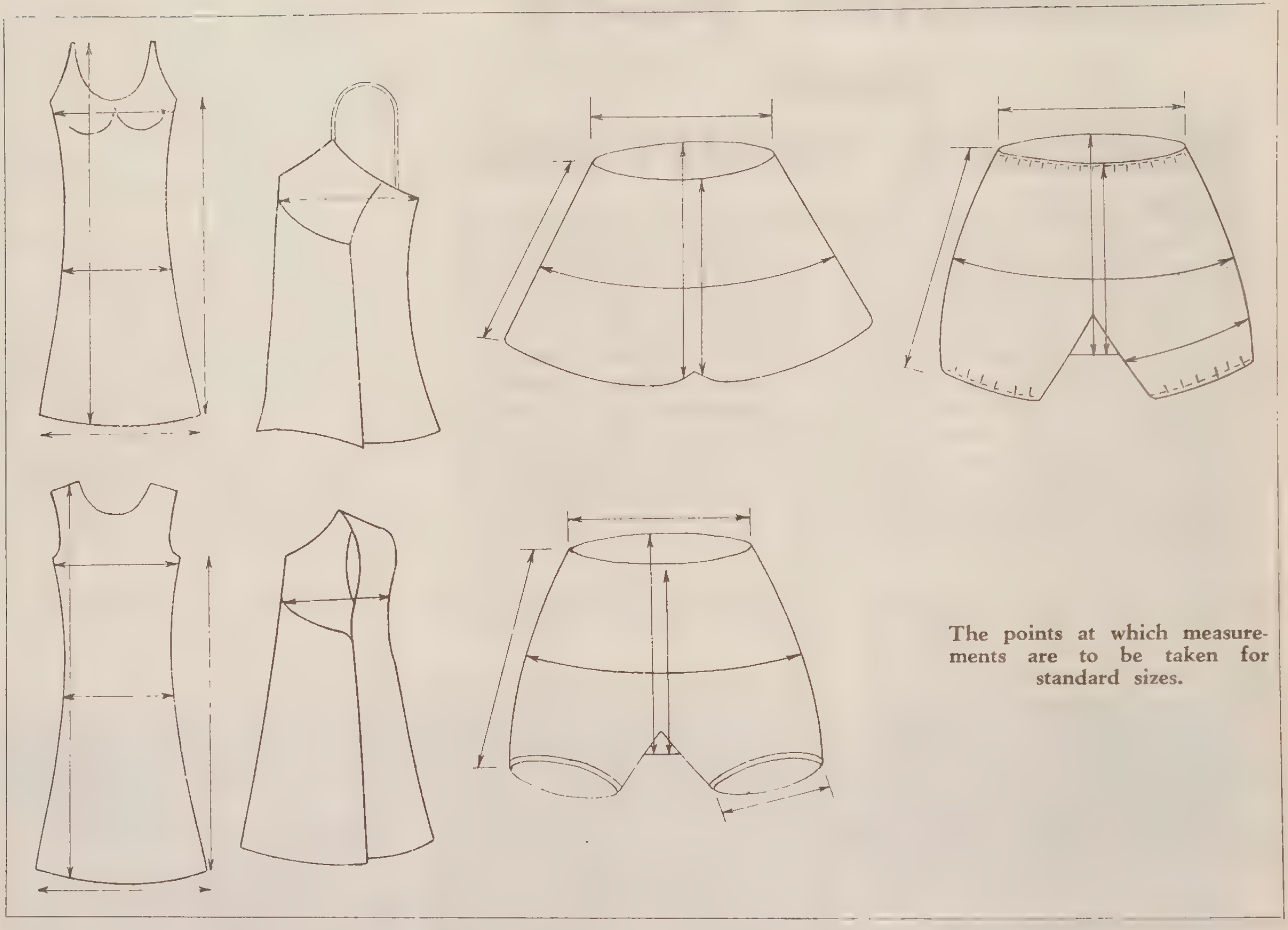
The basic figures used are for "average sizes," but further differentiation is required and can be obtained by a system of grouping. For example, children of one height can be classified into groups, such as "slim," "average," and "stout," or women with one bust measurement can be put into height groups of "short," "average," and "tall," thus catering for most of the variations which occur.

Extending the Range of Fittings

Multiple fittings, as they are called, are not unknown at present. New



All these garments bear the size marking "s.w."



The points at which measurements are to be taken for standard sizes.

Zealand women are becoming accustomed to shoes graded A, B, and C according to width for any one size, stockings with three leg lengths for one foot size, petticoats fitted by height as well as bust measurement, and foundation garments which conform to a wide range of figures. The proposed system would lead to an extension of this method and a more satisfactory situation for both buyer and seller.

If sizes are standardised, once the buyer has determined her correct size re-orders of that size will maintain the same fitting, even if a different style is bought or the garment comes from a different manufacturer or is of a different fabric. For example, in the British Standard Specifications, on which the proposed New Zealand standards are based, dimensions are detailed for petticoats of four different types—woven straight cut, woven bias cut, knitted rayon opera top, and knitted rayon built-up top. Allowances are made for each different type of material and construction, so that a size B.S. 32 in any of these four kinds of garment would fit the same person equally well. In the same way, if 32in. is a woman's fitting for petticoats, it would be the same for vests, nightdresses, and most probably for panties and pyjamas too. However, it might be found that the next size either smaller or larger was more satisfactory for some garments, but again the correct size, once determined, could be bought again indefinitely with the assurance of fitting.

Correct and standardised sizing is of the greatest assistance to a busy woman who has not time to check measurements and make comparisons, and to those who are at a distance from towns and must do a considerable amount of their shopping by mail without the opportunity of "shopping around" or of trying on garments.

The diagrams on this page illustrate for typical garments the positions in which the specified measurements are to be taken. In slips, for example, bust, hip, under-arm to hem, width at hem, and over-all length are required; in knickers, the length from crutch to top must be taken for both back and front; for pyjamas, inner and outer leg measurements are specified.

Standards for Construction

In addition to measurements, minimum standards for construction can also be laid down, including such items as the size of seam allowances, the way in which seams are to be made and finished to prevent fraying or pulling, the number of stitches to the inch required for sewing, and even that "the number of stitches per button shall be six of single thread cotton." These standards are minima, and put no limit on good workmanship and fine finishing in better-quality articles.

The position is well stated by this quotation from a publication issued by the National Bureau of Standards of the United States: "Such a programme [of size standardisation] does not disturb the prerogative of the producer to fit and style garments according to his own ideas. The producer only agrees to use boys, girls, or women with the same body measurements as those used by his competitors in designating or fitting given sizes. . . . Apparel sizes can now have uniform significance whether to manufacturers, distributors, or customers."

No final results have yet been reached in New Zealand, but draft suggestions are being circulated among interested parties. Representatives of women's organisations are assisting in this work, and all women who are interested now have an opportunity of making their requirements known and of helping to improve a situation which has been annoying many of them for years.

A Cot Mattress Made from an Old Car Seat

WITH its basis the skeleton of an old car seat, and the other materials either inexpensive or saved from the scrap heap, a cot mattress can be made which is so luxurious that the baby will be the most comfortably bedded member of the family. Steps in this conversion work are described in the following article by Eirene Unwin, Rural Sociologist, Department of Agriculture, Dunedin.

MATERIALS used to make the mattress were a thin car seat without any of its padding or covering (bought at a sales room for 2s.); an old kapok mattress that had lost all its stabbing but of which the ticking was in good condition; some sugar bags and other odd pieces of hessian; padding and horsehair from a derelict couch; two hanks of fine fishing line (6d. each); and other odds and ends for stuffing. Upholsterer's flock or wool waste is cheap and can be substituted for the stuffing used in this example. Some wire, a bag needle, an upholsterer's needle made from a crochet hook or knitting needle, 10 leather circles for stabbing, some strong cotton to match the ticking, and a strong coarse needle complete the equipment necessary.

Evening up the Spring Seat

It is important that the car seat be a thin one, not more than 5in. thick at the highest part. It should be only 3 to 4in. thick on either side when evened up.

Go over the whole seat and bend in any ends of wire that may be sticking out. Fasten any loose springs securely with wire. Straighten the frame if necessary. One long side is shorter than the opposite one; directions for dealing with this are given later.

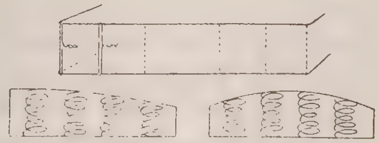


Fig. 1—Wiring down the high side of the seat.

The springs are higher on one side than the other, and the frame on the high side must be pulled down and wired to the base of the framework to match the other side (Fig. 1). About six wires are sufficient, placed approximately as shown. Twist the ends of wire in each loop together with pliers, and bend the twisted ends in.

Covering the Springs

Cover the top ends and sides of the seat with a piece of hessian, but not the underneath. Envelope the corners and sew round the bottom framework, using a sack needle and fine fishing twine (Fig. 2). Fairly large stitches may be used, as they will be covered up.

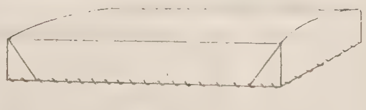


Fig. 2—Enveloping the corners of the spring cover.

As a single knot will pull through the hessian, always begin a new thread with a simple slip knot (Fig. 3).

First Layer of Padding

Using horsehair, wool waste, upholsterer's flock, or odd pieces of woollen material, pad the top of the mattress, putting more padding on the sides than on the middle so that, when finished, the mattress is level on top (Fig. 4). The padding should be laid carefully so that it is not lumpy, but absolute smoothness is not essential, as there are two more layers of padding to come. This layer should be not more than 1in. thick in the middle and sufficient at the sides to make the top level. If too much padding is added now or later, the finished mattress may be so high as to be dangerous. A high mattress raises the floor of the cot, and the baby may be able to clamber over the top and fall out.

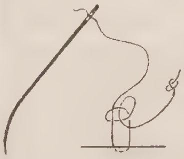


Fig. 3 — The slip knot which should be used when beginning a new thread.

Squaring the Ends

Bring the padding down over the ends on what was the short side of the original seat, so that the mattress ends will be square and not slanting inward (Fig. 5).

As squaring the ends with padding alone is not very easy, it might be better to wire two strong wooden slats to the base of the seat, one the full length of the long side and the other the same length but projecting from either end of the shorter side. Cross-bars could then be screwed to these at each end. Alternatively, a rectangular frame could be constructed first, then wired or bolted to the base of the seat. However, that would be more difficult for a woman to do, and squaring the ends with padding alone is reasonably satisfactory. If a wooden framework is used, the cover would be tacked to it, not sewn round the wire base as previously described, or a rectangular base could be made of stout wire and wired to the original frame, but that probably would also be a task for a man.

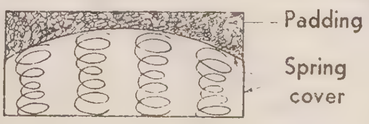


Fig. 4—The first layer of padding.

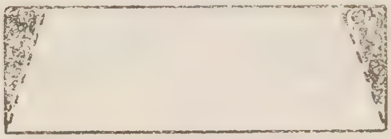


Fig. 5—Extra padding is needed at the ends to make them square.

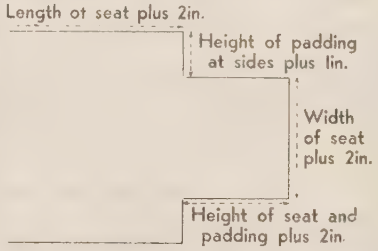

Length of seat plus 2in.
Height of padding at sides plus 1in.
Width of seat plus 2in.
Height of seat and padding plus 2in.

Fig. 6—The shape to cut each end of the padding cover. The extra 1 or 2in. is necessary for seam allowances.

Covering the Padding

A second or padding cover is now put on, but before it is completely sewn extra stuffing is pushed in under it. Hessian is again used, cut to the shape shown in Fig. 6. The reason for this shape becomes clear when the cover is sewn in position.

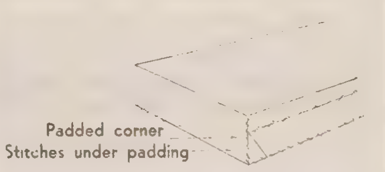


Fig. 7—Sewing on the padding cover.

Tuck the padding cover under the padding at one side and sew it to the first or spring cover and to the top of the wire frame. At the ends the cover must be taken right down to the bottom of and under the extra padding which was necessary to make the corners square. Sew it as shown in Figs. 7 and 8, stitching the flap down

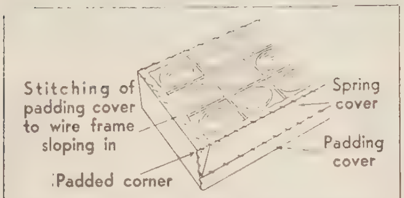


Fig. 8—A bottom view of the stitching on the padding cover.

the corners and to the spring cover and wire frame at the base. Be careful to keep the extra padding a good square shape so that the end of the mattress will be rectangular.

At the padded corner the hessian must be taken partly under the bottom of the mattress to reach the wire. If a wooden base has been made, the padding cover will be tacked to its ends; if the base is of wire, the cover may be sewn to it. In either case the spring cover will have been sewn to the original wire base, and the padding cover will be necessary right down to the bottoms of the ends to cover the extra padding.

Second Layer of Padding

The padding cover should be stitched from about the middle of one side, round one end, and halfway along the second side, and then the loose end turned back and kapok from the old mattress pushed in on top of the stuffing and under the cover. Sufficient should be put in to make a slightly-rounded top, and the corners and edges should be stuffed firmly.

When one end is stuffed the sewing is continued round the other end and back up the first side until only about 1ft. is left not sewn up. Kapok to pad the rest of the top of the mattress is pushed in through this space. When sufficient kapok has been put in and worked smooth and firm, the last foot of sewing is completed.

Be careful not to add too much padding. The mattress should not be more than 7in. high at this stage.

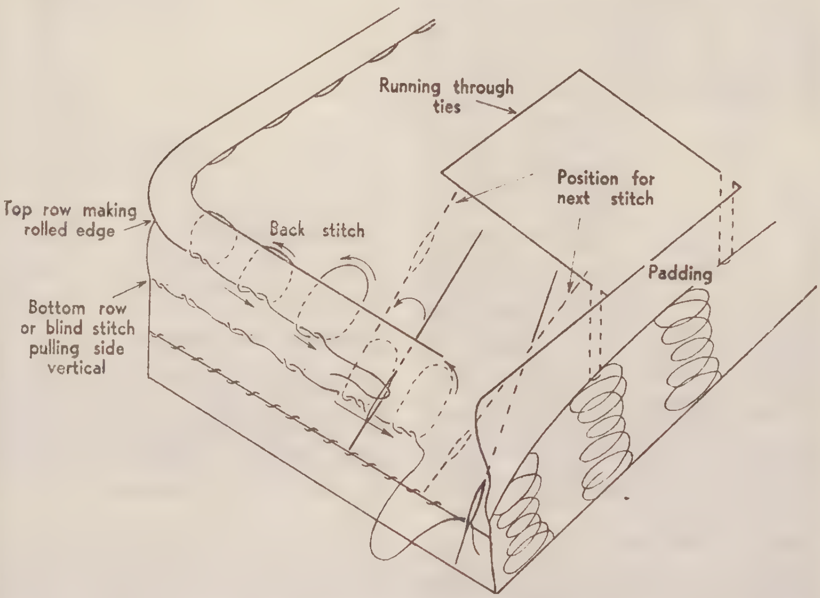
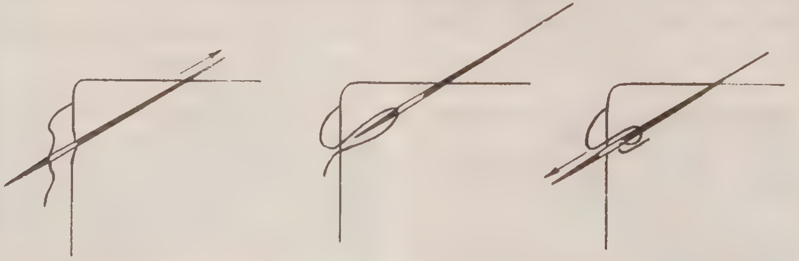

Running through ties
Position for next stitch
Top row making rolled edge
Back stitch
Padding
Bottom row or blind stitch pulling side vertical

Fig. 9—Above: Making the rolled edge and pulling in the bulge of the sides. Below: Making a blind stitch; push the needle through from side to top (left) but do not pull it right out (middle), then push it back eye end first (right), making a back stitch ¾in. long.



Making the Rolled Edge

For the making of the rolled edge and the straightening of the sides an upholsterer's needle is an advantage, though a bag needle can be used and makes a fairly satisfactory job. An upholsterer's needle can be made at home from a coarse metal crochet hook or knitting needle, the ends being pointed with first coarse and then fine sandpaper and the eye being drilled with a steel drill; if the knitting needle is steel, a power drill will probably be necessary. The pointing should be done before the eye is drilled, and the edges of the eye smoothed, first with the drill by holding it slanting, and then with sandpaper wrapped round a fine knitting needle, which is rubbed up and down through the hole.

To make the rolled edge, work the kapok well out to the edges and corners and sew it tightly with two rows of stitches (Fig. 9). Lines for the stitching should be drawn first, so that the roll will be straight. The bottom row of stitches is best done first. The two rows of stitches are made in the same way, except that in the bottom row the thread is not taken right through the mattress to the top but only round some of the stuffing. To do this, push the double-pointed upholsterer's needle in at the side of the mattress on the line for the bottom row of stitches and bring the point out through the top about 3in. from the edge—less if the needle is not long enough. Do not pull the needle right out, but leave the last inch or two in the mattress and push it back again, eye end first, so that the point at this end comes out on the line about ¾in. back from where the thread went in. As the thread is pulled tight the stuffing at the edge is held firm and square. Twist the thread round the stitch just completed before going on. Continue this right round the mattress.

The upper row of stitches is then made in the same way, but the needle is taken right through to the top each time. Again the return stitch is a back stitch, about ¾in. long, and the twine is twisted round the completed stitch each time before continuing. Both rows of stitches should be pulled tight and not left loose as shown in the diagram. The diameter of the finished roll should be hardly that of a broom handle.

Should only a bag needle be available, both rows of stitches will have to be brought through to the top, as a double-pointed needle is necessary to do the blind stitch shown. In this case the top row may be done first, as a bag needle is short, and it is difficult to get it right through if the upper edge is not already held tightly by the upper row of stitches. The mattress in the photograph did not have lines drawn for the row of stitching, and in consequence the roll is not quite straight. The lower row of stitching pulls in the bulge round the sides, making them vertical and firm.

Tying the Padding

Catch the padding and its cover down to the spring-cover with long running-through ties (Fig. 9). To do this push the needle through from the top of the mattress and pull it out below between the springs. Push it back about ½in. away from where the thread comes out and bring it right through to the top of the mattress again. When the twine is pulled tight it should have passed under the spring cover only, or the netting top of the original seat, but not round any of the springs. Long stitches are taken on the top of the mattress so that a rectangle is formed (Fig. 10).

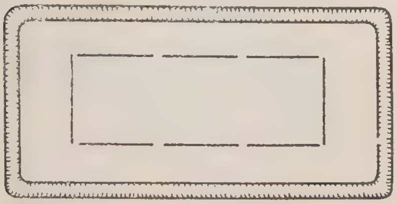


Fig. 10—Top view of the rolled edge and running-through ties completed.

Ticking Cover for Top

Cut a double piece from the washed mattress ticking to fit the top of the mattress but with about 1in. extra all round for seam allowance, and sew it flat and taut on to the hessian covering along the outer edge of the roll. Slightly-slanting running stitches with plenty of back stitches may be used, and they need not be done very finely, as they will be covered.

The raw edge is not turned under but left free, and the row of stitching is about 1in. in from it. Care should be taken that the line of stitches is straight.

Third Layer of Padding

The third layer of padding is a thin one, its main purpose being to fill in the groove made by the rolled edge. It should not make the mattress more than 8in. thick at the highest part.

As before, the stitching should be taken from about the middle of one side, round one end, and halfway up the other side, and then another layer of kapok is worked under the double ticking to give a smooth, rounded top to the mattress. The groove made by the rolled edge is thus filled up. This is the final layer of stuffing, so it should be spread carefully, but not too much should be used. It should be worked out well to the corners and edges.

When one half has been stuffed, continue the sewing as before, leaving a gap of about 1ft. on one side through which to stuff the other half of the top. When sufficient kapok is in and has been arranged smoothly finish sewing down the ticking.

Covering the Sides

Cut a long strip of ticking to cover the sides of the mattress. To make it long enough to go right round, several pieces may need to be joined together. The strip should be as wide as the thickness of the mattress plus 2in. (1in. seam allowance top and bottom). One side of this strip is turned in and sewn finely and neatly to the top ticking, just covering the row of stitches with which this was sewn to the hessian. If this first row of stitches was straight, the final seam will be straight too. Continue sewing right round the mattress. If the corners have been kept square throughout, there should be no difficulty in fitting the ticking smoothly round them.

As this hand sewing takes rather a long time, it might be possible to machine the edge strip to the top ticking before sewing the top piece to the mattress. Careful measuring and marking would be necessary, and only a skilful and experienced person should attempt it, as it would be extremely difficult to get a good fit when finally putting the ticking cover on to the mattress. The piece covering the top would still need to be sewn to the outer edge of the roll as described, the machined-on strip being turned back meantime, or the final stuffing would not stay in place on top of the mattress but might slip over the sides.

Stabbing

Cut tabs about as big as a florin out of old thin leather or thick felt. Ten were used for the mattress illustrated and arranged as shown in Fig. 11. A long needle is again necessary. The twine is first threaded through the tab, then taken right down through the mattress, under the spring cover but not around the springs, back up through the mattress again close to the downward stitch, and back through the tab from the under side.

The needle is then unthreaded and the short end knotted round the long end as shown in Fig. 12. This is a slip knot, and it is tightened by pulling on the long end, thus pulling the tab down close to the mattress and making a hollow in its surface. To fasten off the long end, make a single knot in it, keep it loose, and work it right down close to the slip knot. Then pull it tight and cut off both ends about ¼in. long.

When stabbing is completed the mattress should have been brought back to a maximum height of 7in.

Covering the Bottom

Cut a piece of hessian to cover the bottom, again leaving a good seam allowance. Pin it, with the raw edge turned in, to the lower edge of the side ticking, so that the seam will come right along the bottom edge of the mattress. Both this hessian and the side ticking should be stretched tightly.

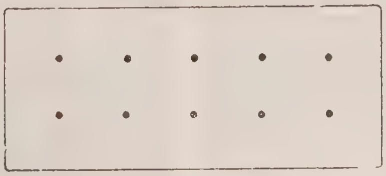


Fig. 11—The stabbing pattern.

When sewing these two together the stitches may be taken through the original hessian which covers the springs and should be fairly small and neat. If a wooden frame has been put round the bottom of the mattress, first the side ticking and then the bottom hessian should be tacked to it.

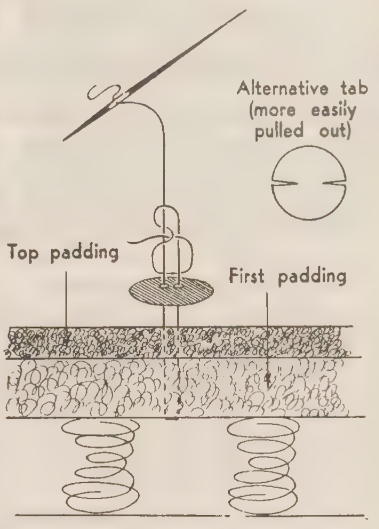


Fig. 12—The method of stabbing the mattress.

Chaff Shakedown

From the remainder of the ticking make a cover, double if possible, for a chaff shakedown to lie on top of the spring mattress. It should be 2in. thick and as wide and as long as the spring mattress. Stuff it with chaff or, preferably, winnowings, using only sufficient for a level 2in. when it is evenly spread. Do not stab this mattress.

The shakedown is used on top of the spring mattress to protect it from being soiled. The spring mattress cannot be cleaned easily, but the chaff can be emptied out of the shakedown and renewed, or baked to sterilise it, and the cover can be washed. A full-sized waterproof sheet on top of the shakedown gives further protection.

Tucking the bedclothes under the heavy and awkward spring mattress is almost impossible, especially if it is a tight fit in the cot, which is another reason for having the shakedown on top.

When the mattress and shakedown are in place, the top of the cot must be high enough above the top of the mattress to prevent the baby putting his elbows over it when standing up.. If the sides are not high enough, the addition of an extra rail or lowering the base of the cot may be possible.

If the baby grows too tall for safety before being ready for promotion to a bed, a thinner mattress may need to be substituted; the spring mattress can then be used for a very comfortable window seat.

BUTTER RATIONING AND AID FOR BRITAIN

National Council Considers Continuance Essential

A DECISION that it was essential that butter rationing should remain in force in New Zealand, and that it would be preferable not to increase the quantity beyond the 6oz. at present permitted to each person, was unanimously reached at a meeting of the Aid for Britain National Council early in November.

"THIS decision," states a report from the council, "was made with full knowledge of the problems which rationing involved for certain sections of our people. The housewife in particular, especially where there is a large family, finds difficulty with the present butter ration, and the National Council is appreciative of the fact that for some years these problems have been met without complaint. It is important that if these difficulties are to continue, the people themselves should fully understand the facts of the situation.

"The normal British butter ration has for year after year hovered round 3oz. per person per week. Apart from a further 4oz. of margarine and 1oz. of cooking fat, this is the only fat available from any source. Every piece of fat is sliced off the consumer's rare chop, his tiny roast, even his soup bones, and collected from the butchers for rendering down. The infinitesimal amount of dripping remaining from a small roast in Britain is insufficient for frying, baking, or any cooking purpose.

N.Z. Housewife Well Off for Fats

"In comparison with this, in New Zealand fats are unrationed. True, the amount of butter is restricted, but it is possible to buy first-class lard or dripping in practically any butcher's shop without limit. The housewife has unlimited quantities of splendid home-produced dripping available from her frequent roasts. With the lifting of meat rationing she will be even better off in this respect.

"Those who are inclined to resent having to use dripping or lard instead of butter for baking or frying may remember the days not so many years ago when even this form of fat was rationed for many people by the inability of the housewife to afford it. In those days good, rich dripping was welcome. It should be equally welcome and more welcome today when we think of the degree of hardship which the British people have long endured, and the fact that it is within our power to help materially."

A Sixth off British Ration

New Zealand at present supplies just over half the entire butter ration in Great Britain. If rationing was abandoned in New Zealand, supplies to Britain would be reduced by some 14,000 tons, and if Australia followed suit, the loss would be some 40,000 tons. This would mean ½oz. off every British butter ration, which cannot be made up in any other way. Nothing is available in its place, and every child, every mother, every worker in Britain, at the height of their crisis, would be deprived of one-sixth of their butter ration.

"If, as some claim here, quite wrongly we think," the council's statement continues, "our children's and our womenfolk's health is suffering because they have to use dripping in place of butter, what would be the result on the health of the children and the women in Britain, after years of near-starvation, if at one blow we deliberately lopped a sixth off every person's ration? Surely, knowing all the facts, none could reconcile such an act with his conscience. . . .

Argument About Other Markets

"The claim has been made, honestly in some quarters, speciously in others, that we are not sending the butter to Britain, but are rationing our people to send butter to Canada and other markets.

"This is confused thinking. It is lumping two distinct issues into one. No matter whether rationing here continues or is abandoned, the decision as to whether to send small quantities to other markets will remain. This decision must be based on considerations of prudence, of forward looking, whose importance must be assessed by the Government as the people's executive. Maybe some sections will argue against provident foresight at this stage, but let those arguments stand on their merits. They have nothing to do with a decision upon rationing."

In 1942, when Britain had almost exhausted her overseas investments by purchases of munitions and raw materials for the common war effort, Canada gave a free gift to her for these purposes of $1,000,000,000 (£250,000,000). She has also given loans aggregating some $5,000,000,000 (£1,250,000,000) on extremely reasonable terms. She has boosted her export of wheat to Britain from 69,000,000 bushels in 1938 to 136,000,000 bushels last year. She has built up her ham and bacon exports to Britain from 94,700 tons in 1938 to 116,000 tons last year. She has increased her treated milk exports to Britain from 16,000 tons prewar to 92,133 tons today. All Cheddar cheese in the two chief cheese-producing provinces, Ontario and Quebec, was requisitioned from July to October this year for export to Britain. Because Canada is a harsh land where cows must winter indoors, butter production is precarious and expensive, and for many months each year she has always had to rely on imports. She has concentrated instead on the things she can do cheaply and she has done them well.

"If we look at our small exports to markets such as Canada in the coldest of terms, in the light of our own self interest only," states the council's report, "we find that the 1000 tons we are sending there this year is a small fraction of the 14,000 tons our rationing saves. **Even** if we export to other markets all of the 3 per cent. Britain has agreed to, it will total only some 3000 tons, a small part only of the saving.

Token Quantities to Future Markets

"Before the war we found it hard to sell enough of our butter to dispose of our production. Denmark and the Baltic States fought us fiercely for the British market, and Britain, which at that time had, in addition, some home production of her own to consider, was unable to take all we could produce. Beyond the quantity she could take we had to sell the rest of our prduction where we could, in the U.S.A., in Canada, in the Far East, in India, in South America. We must be prepared, for the day may come when we shall need those markets again. Is it not then only sense to send token quantities there to keep our name alive and to maintain our markets?

"Further, this butter earns us dollars, and with the dollars we get farm machinery and productive equipment to help us produce more food. . . .

"Let us not forget the shadow of later bitter competition from margarine which lies across our future butter sales. It would be sheer foolishness to ignore these factors, and our farmers and indeed the whole community would call the Government sharply to task in a few years for imprudence if they failed to take the limited steps available now to protect the future.

"All this, however, does not mean that we are rationed to protect our markets, or to help the Canadians or others. Our rationing saves 14,000 tons a year. So far we have sent 1000 tons to Canada, and we may at the most send to markets outside of Britain 3000 tons. We would want, for reasons indicated above, to send this quantity anyway, rationing or no rationing. . . . Let us not be fooled by talk of exports to other markets. These would in all common sense have to continue and are really outside the rationing argument.

"We are still fortunate to be able to play a big part in maintaining the health and producing power of our kin at home. . . . Surely our women were right when they said recently through their Women's Institute that they were shocked, disgusted, and hurt at a suggestion that we abandon rationing, abandon our privilege of helping those whose need is so great."

The Aid for Britain National Council, the statement concludes, is confident that the people of New Zealand, knowing the facts, will continue to insist that the Government retain rationing here.

New Zealand's Rich Store of Children's Books

By

ENID B. V. PHILLIPS

PARENTS can do much to offset the present craze for "comics" and other rubbishy reading matter by seeing that their children are kept plentifully supplied with good books. This should not be difficult, for the education authorities are keen to do their part and assist the pupils' natural desire for knowledge both by means of school libraries and a system of projects whereby the looking up of facts in encyclopaedias and other reference books becomes a distinctly pleasurable pastime. Every public library, too, has its junior section, where boys and girls may borrow the books of their choice, and every bookshop worthy of the name (and New Zealand bookshops compare very favourably with those overseas) caters in some measure for children's tastes. In most bookstores not only the established classics of childhood are available, but sandwiched in between the books of Maud and Miska Petersham, Ingri and Edgar Parin d'Aulaire, Eleanor Farjeon, Lucy Fitch Perkins, L. A. G. Strong, and numerous other modern authors are a surprising number of New Zealand names.

THE action of the New Zealand Library Association in awarding annually a medal for the best children's book by a New Zealand author should prove a decided stimulus to the creators of children's literature in this country. In naming the medal after the late Esther Glen to commemorate her work the association has followed the precedent set by the Newbery and Caldecott Awards in America, which bear the names of pioneers in children's literature.

Miss Glen inherited in rich measure the literary bent of her parents. Her sister, Mrs. Helen G. Turner, was also a writer. Like many another aspiring author, in her earlier years she had to earn her livelihood at some less congenial occupation (in this case office work); nevertheless she managed to fit in a good deal of free lance journalism and write books which have endeared her to successive generations of children. "Six Little New Zealanders," probably the best loved of them all, originally had a Maori title, but because New Zealand was so much in the news at that time owing to the Gallipoli campaign, the English publishers altered the title accordingly. Other books by Miss Glen are "Uncles Three at Kamahi" and "Robin of Maoriland," a smaller volume, though nonetheless charming, being "Twinkles on the Mountain." This was illustrated by a local artist, Daisy Osborne.

Sensitive Delineation

To read again in later years a book that one has enjoyed in childhood is too often a disillusioning experience rather like visiting the scenes of one's youth only to find that everything has shrunk to unbelievably-small proportions and the old remembered magic has gone. Esther Glen's work is more than equal to such a severe test, however. Her descriptions of the Canterbury countryside with its placid fields and tussock-covered plains, its snow-fed rivers, and magnificent backdrop of mountain grandeur, her delightful sense of adventure, her spontaneous humour and dramatic skill, and, above all, her sensitive delineation of the joys and sorrows, the struggles and achievements that are so typical of family life (she herself was one of 12 children) still have the same power to enthrall the adult reader as well as the youngster perusing the pages for the first time.

The resignation of Miss M. Brown, who edited the children's page of "The Sun," Christchurch, gave Miss Glen a unique opportunity for exercising her remarkable gifts not only as a writer, but as the founder of a scheme to interest children in social welfare. Under her guidance her youthful correspondents collected all manner of goods for distribution among the poor and needy, many of them thus qualifying as assistants to Santa Claus, and also entertained orphanage children at a big party each Christmas. "Lady Gay," the name Miss Glen was known by, encouraged her "Sunbeams" to write plays and stories, and in the children's radio session which she conducted with the help of "Mr. Wiseman", a well-known member of the "Sun's" staff, she featured many of these original contributions, a decided innovation in those days. In collaboration with Miss G. Mackay, sister of the poet Jessie Mackay, Miss Glen wrote

Esther Glen, whose literary work in New Zealand has been commemorated by the annual award of a memorial medal for the best children's book by a New Zealand author.

the script of three pantomimes which were produced by "Mr. Wiseman" at the Civic Theatre in Christchurch and so augmented the funds for her Christmas mission.

When "The Sun" ceased publication she became children's editor of "The Press," Christchurch, and forming her proteges into the crew of the "Press Ship," she continued her good work to such effect that it culminated in the endowment of a cot at the Cholmondely Home. Another novel idea in connection with her extensive newspaper activities was the introduction of the penfriend scheme. "Treasure of the Stars" was the serial which she wrote for the children's page of "The Press".

Up to the time of her death, February 9, 1940, she was the only woman to have gained the award of the New Zealand Journalists' Association for an open competition. Her last book was called "Betty of Blue Bay." She had intended reconstructing the first few chapters, and the manuscript is being held pending the proposed alterations which may be undertaken by her nephew, so there is still a possibility of its being published.

Story of a Lovable Little Maori Boy

The first person to be awarded the Esther Glen Memorial Medal was Stella Morice, of Wellington, for her "Book of Wiremu," the story of a lovable little Maori boy who lived with his uncle in a sun-bleached whare by the Waitukituki River. The author's regard for the Maori people and her understanding of their way of life are apparent from the very first page. Her style is as smooth flowing as the river of which she writes so poetically and she has the art of investing even the most commonplace incidents with interest. Seldom are there characters so completely contented with their lot as Wiri and his uncle Hori and "wise, kind, comfortable Tinopai," his grandmother whose beauty as a young girl caused a contest to be held among the chiefs, the one brave enough to shoot the mighty Kata Kehua falls in a canoe to the rapids below wining her as his wife. The illustrations by Nancy Bolton are fully in harmony with the ancient proverb which prefaces the story:

Whaia ko tetahi take pai
Me whai ko te rangimarie
Pursue something good;
Let it be peace.

Miss Bolton was also responsible for the drawings in Alexandra Mason's tale anent a local window-cleaner, "Baggie and His Famous Cat, Tam," published the same year.

A Versatile Writer

The next recipient of the coveted medal was also a Wellingtonian, A. W. Reed, a versatile writer who, with nearly 50 books to his credit, invariably handles his subject with ease, whether it be map reading, making model toys from matchboxes, Maori myths, or Biblical parables in modern form. His "Myths and Legends of Maoriland," which gained him this well-merited award, is the most ambitious collection of New Zealand folklore yet assembled specially for young people. The legends are recounted with considerable charm and are further enhanced by the magnificent black and white illustrations by the German artist W. Dittmer (these originally appeared in Dittmer's "Te Tohunga," published in the early part of this century by Messrs. George Routledge and Sons, London, and today alas! a rarity) and the striking colour plates and line drawings in the modern manner by a local illustrator, George Woods. Mr. Reed has supplemented this book with another volume suitable for younger children, "Wonder Tales of Maoriland," now in the course of publication, the illustrations both in line and colour being the work of that inimitable cartoonist A. S. Paterson.

Doyens among the Dominion's authors of books for children are without doubt Edith Howes, of Dunedin, and Isabel Maud Peacock (Mrs. Cluett), of Auckland. Each had her first book published the same year, 1910, Mrs. Cluett's venture comprising a miscellany of verse and Miss Howes's book short stories. Since "My Friend Phil" made his happy debut in 1915, and the appearance at 12-monthly intervals of the redoubtable Dicky, knight errant, Patricia Pat, Robin of Round House, Micky and Mac, Ginger, and a host of other appealing characters, Mrs. Cluett has written a book for children annually up to 6 years ago, when she decided to concentrate wholly on novel writing; she has just completed her eleventh novel, entitled "The Bird Shop." (Her first novel was written at the age of 10 and covered 6 or 8 pages of an exercise book. It was stiff with titles and illustrated by the proud author herself with fearful and wonderful effects!) Before leaving on a trip to Great Britain and the Continent she wrote two volumes of humorous verse and a number of little booklets about the quaint wee creatures inhabiting bush and bog, these being illustrated by Gwyneth Richardson and the late Trevor Lloyd and published by Messrs. Whitcombe and Tombs.

The Wonder and Beauty of Nature

Miss Howes has written numerous small books which Whitcombe's have featured in their Story Book series; "Drums of the Sea," the life of Captain Cook, is to be added to them this year. It was a nocturnal, insect-collecting expedition in the bush with her naturalist brother which decided the course of Miss Howes's literary career. As the lamp's rays revealed the multitudinous life under the trees she saw a new world opening before her and at once determined to try to show to others, children particularly, by her writing the wonder and beauty of nature. This resulted in "The Sun's Babies," that distinctive first collection of short stories, which was acclaimed both by the London critics and those in New Zealand. The New Zealand Institute (now the Royal Society) was so impressed that it promptly made her a life member, and A. H. Grinling, the noted literary critic of "The Otago Daily Times," suggested that she write a children's book explaining the facts of nature. the outcome being "The Cradle Ship" (now in its eighteenth edition), which is dedicated to him. Miss Howes firmly believes children should have fantasy and poetry as well as facts if their minds are to grow to true roundness, hence the perennial appeal of "The Cradle Ship." A New Zealand woman doctor spoke about it at a medical conference in Paris and a French doctor asked permission to translate it for French children. A Danish engineer also translated it into his language, and further offers of translation were received from Germany and Italy.

There is an enormous amount of effort entailed in the writing of such a book, for every detail must be verified first, necessitating sundry excursions in search of material, long hours of peering through a microscope, and poring over zoologies before even commencing to write. The same

[*National Publicity Studios photo.*

In their school libraries and the junior sections of public libraries children have the means of satisfying their natural desire for knowledge and good reading.

painstaking procedure is characteristic of all Miss Howes's work. As a preliminary preparation for "The Singing Fish," a story of the seashore, for instance, she spent 6 months on Stewart Island wading in gumboots most of the time to collect the strange and beautiful denizens of the rocks and pools. These she "bottled" to observe and describe them better. Afterwards they were restored to the sea.

Many more nature books followed, also a three-act play, "In Search of Fairies" and some shorter plays for use in schools; once she even tried her hand at a comic opera! The Maori fairy tales of an earlier book were later retold and published in America under the title of "The Long Bright Land," being illustrated by Dorothy Lathrop, who perhaps because of her long acquaintance with Japanese and Persian prints gave her Polynesians a rather oriental cast of countenance. The stories Miss Howes is working on at present are destined for America.

Rare Paragon

Probably the most prolific children's writer at present and one whose popularity is increasing with the passing years is the Aucklander Alice Kenny. She is that rare paragon publishers dream of but so seldom encounter, the author they can rely upon to produce a manuscript to order on a specific date, whether it be a full-length fairy tale such as "The Magic Rings" (this has illustrations by Mervyn Taylor, whose wood engravings are a well-known feature of the New Zealand Academy of Fine Arts exhibitions in Wellington) or an adventure story for girls like "Forest Refuge" or "The Sea Cave" with its Highland setting. Moreover, Miss Kenny possesses an amazing knowledge of automatic firearms, which accounts for the accuracy of such details in the exciting war stories for boys which she writes under the name of Alan Armitage. "The Good Goblin," her sole venture in the realm of children's verse, has long since vanished from the booksellers' shelves.

A like fate has befallen other contributors in this sphere. Actually, a considerable quantity of worthwhile poetry for children has been written in this country, but comparatively little has been published in book form. Readers search in vain for reprints of Eileen Duggan's "New Zealand Bird Songs." Though Miss Duggan modestly refers to them as "simply rhymes," no other poet has written more beautifully of New Zealand native birds than this shy, frail, sweet-voiced woman in whom Divine fire burns so strongly. Nor are copies available of "As the Story Goes," by Betty Knell (Mrs. Maitland), for many years "Fairiel" of "The Evening Post," Wellington. Her work has a freshness and spontaneity and she is capable of depth of feeling, as evidenced in that poignant Easter poem, "The Night Christ Died." Her predecessor, Alison Grant (Mrs. Robinson), who originated "The Post's" children's page, is also a competent poet.

Those who are not fortunate enough to possess "Gloria's Book" and "The Perfume Vendor" must perforce borrow from the library if they wish to peruse the poems of Gloria Rawlinson, who, though confined to a wheel-chair since she was 7 years old, at the age of 15 had "a public, a list of Press notices, and a daily correspondence that many a veteran in the world of letters might envy." Her friendship with the late Robin Hyde (Iris Wilkinson) played an integral part in developing her exceptional gifts, and in the lines inscribed "To Robin Hyde" she pays tribute to the writer who, walking often with pain, did so much to help and inspire her.

Unusual Experiment

In 1943 Feilding journalist Tom L. Mills edited a collection of child verse written by young New Zealanders from 7 to 17 years of age. Much of this had appeared in the Saturday supplements of the New Zealand Press in pre-war days, when newsprint was plentiful, and Mr. Mills's unusual experiment met with much success.

Other books which have burgeoned and had their brief day include Margaret Wells's "Ten Little Maori Moths" (after the style of the nigger boys of nursery rhyme fame), the Harvey sisters' "Flower Fairies" and "Over the Hills" (one sister contributes the text and the other the pictures), and "Just Us," by John Brent (Stop Wrathall's colour plates are attractive, but the verse is somewhat stilted). Joye Taylor's "Verses for Children" is now in its second edition and her new volume is entitled "Little Bells and Other Verses." It is not generally known that Ruth Gilbert (Mrs. Mackay), whose trilogy "Lazarus" won the Jessie Mackay Memorial Award for poetry this year, has written the story of Hansel and Gretel in rhyme. Those who have been privileged to hear some of the delightful stanzas describing the adventures of the whimsical pair with the golden bird look forward to their appearance in print.

CHILDREN'S BOOKS . . .

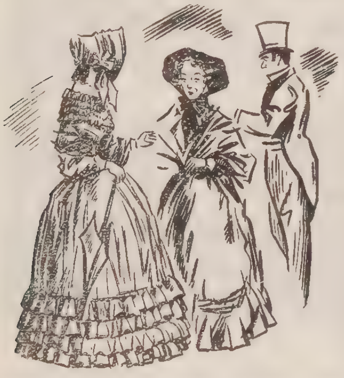
Handsomely-illustrated Publication

A. H. Reed's "A Song of Praise for Maoriland" is easily the most handsomely illustrated publication of its kind produced in New Zealand. Every couplet has its accompanying full-page illustration by George Woods, the pictures alone making the book worth much more than its mere purchase price. This noted author, who at the age of 70 undertook a walking tour of the East Cape of the North Island, recording his experiences en route most entertainingly, edited and also wrote the greater part of "The Isabel Reed Bible Story Book," which contains not only a comprehensive selection of Bible stories, but a brief history of favourite hymns, some beautiful prayers for boys and girls, and a number of Biblical games and puzzles. Contributing New Zealand artists are Gwyneth Richardson, Molly Macalister, and Conrad Frieboe. Mr. Reed's magnum opus, however, is his "Story of New Zealand." (This, too, is dedicated to his wife, Isabel.)

It is indeed a formidable task to present dull facts in such a manner as to render them as fascinating as any fiction, but Mr. Reed has acquitted himself well. He has the faculty of incorporating in his narrative those small but essential details which give vividness to each episode and a satisfying sense of completeness, yet still preserving its connection with the main series of events. The historical maps inside both front and back covers are a praiseworthy feature, likewise the appropriately-illuminated capital letter at the commencement of each chapter. Many of the illustrations are from old and rare books, the work of a former generation of artists. Crossword exercises designed to test the student's ability to remember what he has read offer an ingenious aid to learning and there is a supplementary book list for those wishing to pursue a wider course of reading. "The Story of New Zealand" has already run into two editions, and a special edition for use in schools is to be issued shortly.

A Treasure House of Information

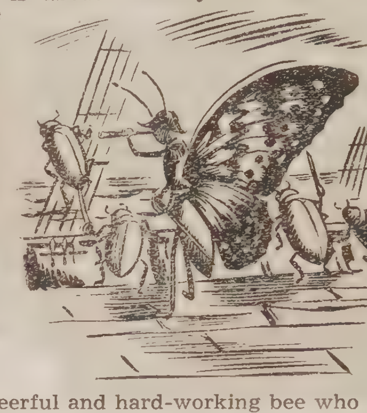
Strangely enough, "The Story of Australia" has been written by a youthful New Zealand journalist who settled for a time in Sydney, Margaret Pearson, of "Poppet and Pete" fame. This Australian history book, which is particularly suitable for very young readers, is a treasure house of information concerning the founders of the colony and is printed in Miss Pearson's distinctive script and is gay with her deliciously-colourful drawings. Last year she spent a holiday in New Zealand to glean material for a similar history of her homeland. Her "Tales of Rowe Street" appeared in Sydney bookshops just before she left for London, where she is now writing for "The Sunday Dispatch" and "The Daily Mirror." Other books for younger readers include Aileen Findlay's read-it-yourself books, "The Three Painters" and "The Little White Gate", published during the war, and "Tales for Pippa," wherein Dorothy Black, of Taupiri, chronicled the doings of her little auburn-haired daughter, Phillippa.



Talented Teller of Animal Tales

The members of the animal kingdom Bryan O'Brien specialises in portraying are at the very opposite end of the scale, ranging from a majestically-proportioned elephant down to a diminutive pet kitten. This talented teller of animal tales, whose turn of phrase is as musical as his pleasingly-modulated voice, called his first collection of stories after his Sunday night radio session, "Storytime with Bryan O'Brien." This was followed by "Stories of Birds and Beasts," and now in response to the Oliver Twist propensity of his public, adult as well as juvenile, he has lately published "More Stories," including "The Valley of the Birds," "Stripes and the Mouse Deer" (set in Malaya), and "The Blind Snow Goose." Joan Smith's sketches, reproduced in the form of photo offsets, have caught the spirit of the stories admirably.

A fellow New Zealander who has only recently returned from a long sojourn in Australia is D. H. Gilmore. He, too, combines the dual talents of writing and illustrating, and his books have brought him renown on both sides of the Tasman. He has taken the tiny garden creatures for his characters and has created a miniature world where "fantasy and reality go hand in hand." One volume is devoted to the adventures of two little silkworms, Catkin and Codlin. Another concerns Cuthbert Caterpillar and Wilfred Wasp; the portly Cuthbert, looking the picture of prosperity in a bowler hat, sets out to see the world in company with Wilfred, who carries all his possessions wrapped in a bundle in the true Dick Whittington tradition. Christopher Cricket, musician, appears in a third book, and a fourth is about Anthony Ant and his encounters with the Earwig Pirates. Eventually he seeks the assistance of Admiral Butterfly and his gallant crew of Water Beetles, and though the Admiral's attire is a trifle threadbare and his ship not of the speediest, his naval strategy is superb and he soon captures the swaggering pirate chief, so long the terror of the seas. D. H. Gilmore's newest publication is "The Tale of Benjamin Bumble," a cheerful and hard-working bee who lives with his brothers Bizz and Buzz beneath a sunny bank.



Apparently the only anthology of children's stories by New Zealand authors is "Yours and Mine", compiled by Warwick Lawrence and published in 1936. This unique collection is interesting not only because of the variety and excellence of its contents, but because many of the contributors have made a name for themselves in other fields of literature; for instance, Eve Langley, Ena Eden, Eric Ramsden, Robin Hyde, and Ngaio Marsh. In the unmasking of Father Christmas in her touching little tale "Moonshine" Ngaio Marsh shows that sense of dramatic climax concerning the solving of mysteries which has made her one of the most brilliant writers of detective fiction today.

There is a noticeable paucity of children's plays published in the Dominion. The Wellington composer Joye Taylor has collaborated with her architect daugther Elizabeth and the artist Elizabeth Paterson in "Twelve Graded Plays for Children" (two series), complete with choruses and songs. "Plays Maori and Pakeha," also in two series, the first suitable for pupils of Standards 1 to 4, the second for those of Standard 4 and Forms 1 and 2, by Janet McLeod, formerly lecturer in English at the Christchurch Training College, have notes, appendix, and illustrations by Leslie J. Lockerbie. Both volumes have been printed by Caxton Press. Copies are no longer obtainable, however, of "The Golden Bird," one of several plays written by Dorothy Tanner before she left Wellington for a 7-year stay in India, where her activities included teaching in St. Paul's School, Darjeeling, trekking twice into Tibet, and instructing in the Women's Auxiliary Corps, attached to the British units of the Indian Army during the war.

Extensive Knowledge of School Life

Another member of the teaching profession to turn author is Winifred McQuilkan, who has relinquished her position as principal of Columba College, Dunedin, to devote more time to writing. With such extensive knowledge of school life to draw upon, it is not surprising that Miss McQuilkan's schoolgirl heroine of "Merry Begins" and the companion volume, "Merry Again," should prove so popular. Miss McQuilkan writes under the pseudonym of Clare Mallory. School stories are also the specialty of Alison George, and Mervyn Elias's sole contribution to juvenile literature sets forth the experiences of a New Zealand boy at an English public school. The titles "Piriki's Princess," "Rifle and Tomahawk: a Tale of the Te Kooti Rebellion," "Martin Thorn, Adventurer," and "Lawless Days" are eloquent of Mona Tracy's stirring adventure tales with a Maori setting. Unfortunately, like many other prewar publications, they are now out of print. (Edith Howes dedicated her book for boys "The Golden Forest" to Mrs.

Tracy (formerly Mona Mackay) and her husband, W. F. Tracy, of Canterbury.) V. May Cottrell has similarly made use of a background of Maori lore and legend in "The Lost Cave of Puterangi." Though it was not written primarily for children, adventure-loving boys and girls find William Satchell's "The Greenstone Door" of absorbing interest, and the same applies to Frank O. V. Acheson's "Plume of the Arawas," in which the scene is laid in the picturesque Taupo-Tongariro region ("sacred Tongariro, towering to the sky") still owned and inhabited by the Ngati-Tuwharetoa tribe, after whose ancestor the novel is named.

Santa Claus in Summer Wear

"A Southern Cross Fairy Tale," written by Kate McCosh Clark, of Auckland, in 1889, "for generations of children growing up under the Southern Cross to whom the yule log at Christmas is unmeaning and the snow unknown" seems to have been the forerunner of New Zealand nature stories for children. The plot centres round a brother and sister who are conducted on a tour of Fairyland (located in the heart of the North Island bush country) by no less a personage than Santa Claus himself. He has forsaken his fur-trimmed robes for attire more suited to summer wear in a sunny clime and he has shaved off his beard, too, revealing a remarkably-youthful countenance for one so venerable. The artist, R. Atkinson, with commendable imagination has depicted his holding court under a huge tree fern, his head crowned with the stars of a southern constellation and in his hand a star-tipped magic wand. The famous pink and white terraces were also included in his itinerary, along with a mysterious geyser which hurled goblins as well as great plumes of steam and scalding water skyward in grotesque succession.

The author, who acted as co-artist, says of her work that while seeking to amuse, it is intended to convey pleasant information, the habits of plants and animals being in sober reality just what they are made to appear in Fairyland. Furthermore, she mentions receiving assistance from such authoritative sources as F. Reischek, F.L.S., and Professor Thomas, F.L.S., F.G.S., and the loan of their valuable notes, etc., "lay me under much obligation" as she quaintly phrases it. Several years later she wrote "Persephone and Other Poems," and her "Maori Tales and Legends" were published in 1896.

A similar accuracy with regard to descriptive details in text and drawings distinguishes the modern nature books of Mollie Miller Atkinson—"Richard Bird in the Bush," rhymed, hand-lettered, and decorated for a small boy who came from England at the age of 4; the sequel "Richard Bird at Sea", with its frieze of shells and sea creatures adorning the bottom of each page; and "Bird Watching," based on the author's observations in her own garden and the bush.

The exquisite colour plates in Olga P. Burton's "Stories of Bird and Bush" were painted by Lily Daff, of the Otago University Museum, under the direction of ornithologists appointed by the Forest and Bird Protection Society of New Zealand. Miss Daff was also responsible for the illustrations in Mona Gordon's "The Children of Tane," which deals with New Zealand bird life, her latest volume, "The Garden of Tane," recording not only the lovely legends relating to New Zealand native trees, but the biographies of the Dominion's celebrated botanists, the chapter concerning the late Thomas Cheeseman being an especially-fine commentary on the man who compiled that "perfect Bible of a book," the 1163-page "Manual of the New Zealand Flora."

A Positive Best Seller

What was really intended as a zoology handbook for the Auckland Museum in particular, and a popular treatise on New Zealand's native fauna in general, has to date proved a positive best seller. Every one of the 411 creatures listed in "Native Animals of New Zealand," varying from sea elephants to spiders, bellbirds to beetles, has its individual quota of pithy description, and in addition, has been illustrated by the author, A. W. B. Powell, whose scientific papers on New Zealand shellfish and fossils earned him the Hector Medal last year from the Royal Society. This capable artist, now assistant director of the Auckland Museum, has with but a few exceptions drawn all the figures from actual specimens, these representations being recognised much more easily by the average reader than the usual text book diagrams.

This type of field book has long been needed in New Zealand and its appeal is such that quite young children will pore over it for long periods, fascinated by the strange fish and other forms of marine life and perhaps identifying their latest find from the garden or the handful of shells they gathered at the beach. In fact, at a recent children's party the 8-year-old hostess, evidently feeling the need of a little mental refreshment, selected Mr. Powell's book from among her pile of birthday presents and settled herself comfortably on the hearthrug where she proceeded to inspect her new possession. She soon became so absorbed in the study of stick insects that she was completely oblivious of the boisterous game of skittles in progress alongside her. Mr. Powell, who was a keen naturalist himself at an equally-early age, is an active member of the Auckland Society of Arts, and photography is one of his hobbies too. Amid the shells, specimen jars, and other paraphernalia in his spacious, book-lined sanctum at the museum are numerous examples of his skill as a photographer, many of his photographs having appeared in his first book, "Shellfish of New Zealand."

One of his museum colleagues, the ornithologist E. G. Turbott, has also demonstrated his ability to present scientific facts in a simple and interesting manner. The preface to Mr. Turbott's handsome volume, "New Zealand Bird Life," was written by Miss Nancy Wilson, who stresses the importance the late Chief Scout, Lord Baden-Powell, placed on the study of birds by scouts and guides. The photography, which is outstanding, is mainly the work of Major G. A. Buddle.

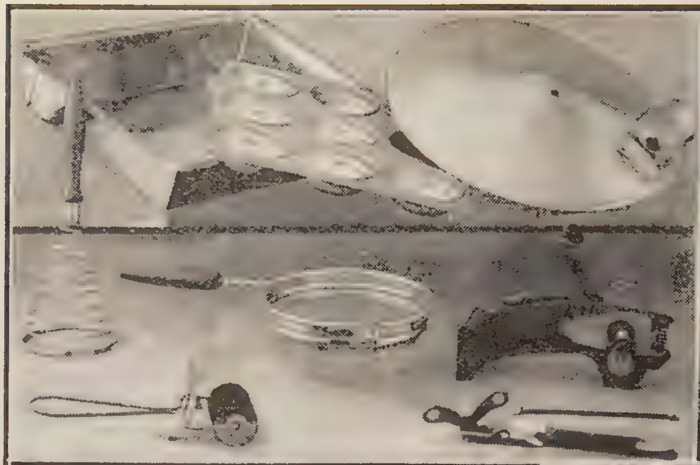
Study of Penguin Life

Another scientific writer who has lately turned his attention to writing for children is L. E. Richdale, honorary lecturer in zoology at Otago University. The penguins on Otago Peninsula have been his particular study for the last 11 years, during which time he has travelled 40,000 miles by car to visit the different colonies, the result being that "Podgy the Penguin" contains a great deal of new data concerning the habits of penguins which have not been printed hitherto even in ornithological papers. Indeed, to obtain a thoroughly intimate knowledge of his hero Mr. Richdale once camped for 8 weeks beside Podgy's nest, taking many excellent photographs during that period. It was no wonder that Dr. Robert C. Murphy, chairman of the Department of Birds in the American Museum of Natural History, New York, who visited New Zealand early this year, was impressed by "Podgy the Penguin." A subsequent story will in all probability deal with the adventures of Podgy's progeny, Fat and Skin.

It is hoped that this survey will not only give the book-buying public some indication of the wide range of children's literature achieved by New Zealand authors and so ensure a practical response, but will also develop a deeper appreciation of the creative talents of

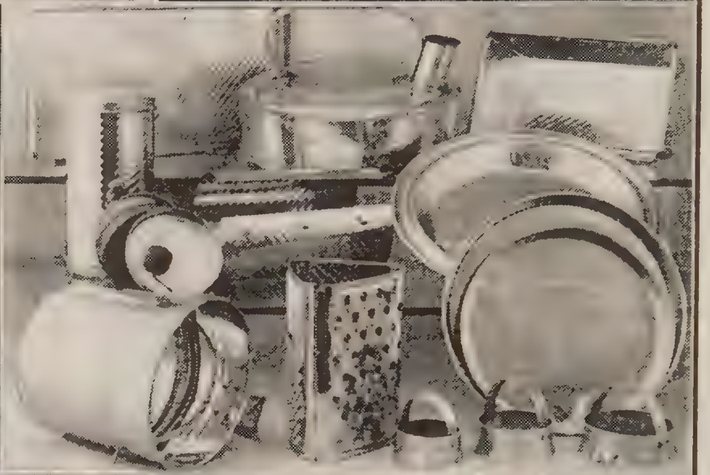
all those who . . . make
A lovely book for childhood's sake.
The printed words in rhyme or prose,
The coloured page that lures and glows—
A mighty task it is indeed
To make the books that children read.
Through lilting word, through picture gay,
To foreign lands they've sailed away,
And on imagination's wings
They find the most exciting things!

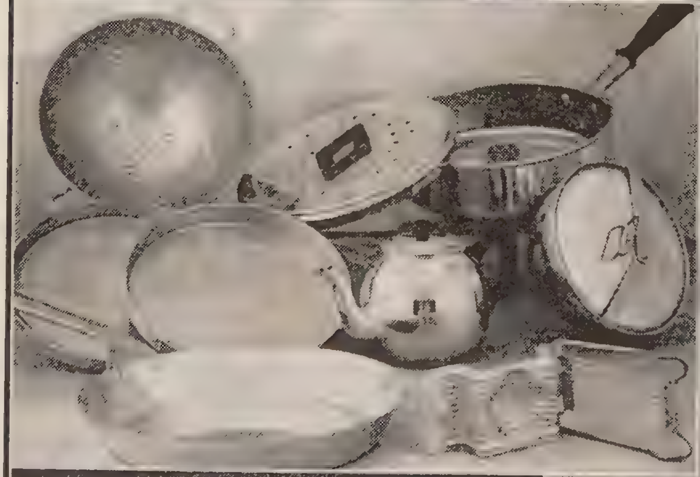
KITCHEN ACCESSORIES



Left—A group of kitchen accessories including a tin frying pan lid, tin openers for fastening to the wall and for use in the hand, a strainer, and a parsley cutter.

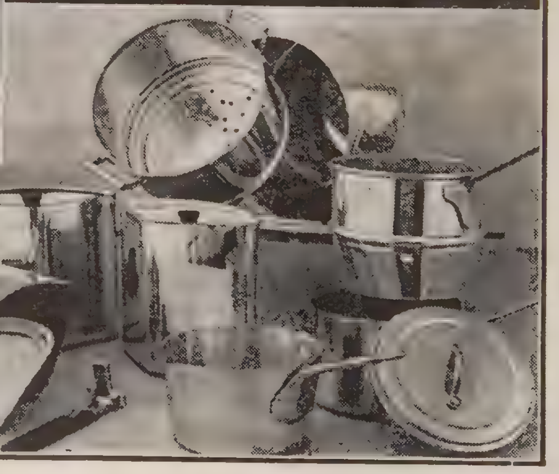
Right—Tinware utensils, including nut loaf tins, seamless sandwich tins, a pie plate with non-spill edges, a flour sifter, a grater, and biscuit cutters.





Left—Aluminium ware, including a cutlet pan (a deep frying pan with a perforated lid to prevent fat splashes), a pudding basin with a cover, and an egg slicer.

Right—Aluminium ware, including a set of triangular pots with a detachable handle, a steamer to fit two sizes of saucepan, and a two-lipped milk saucepan.



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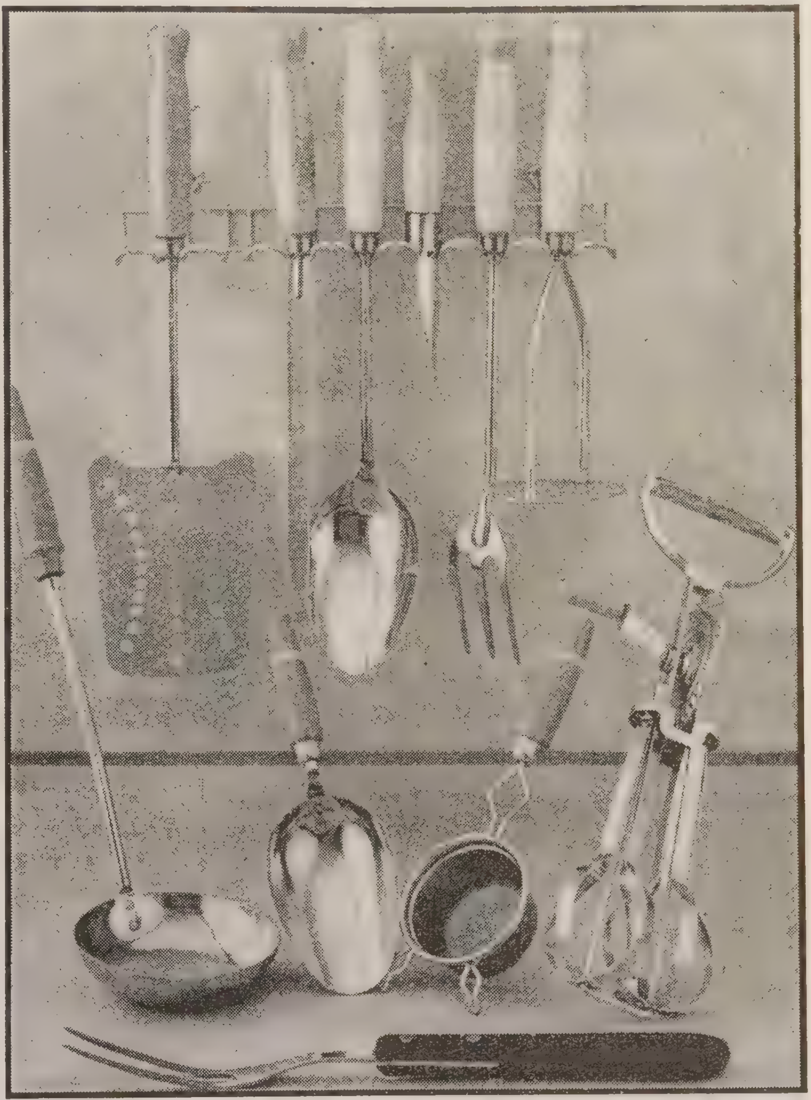
Design and Materials for Kitchen Utensils

DISCOURSES on the general principles of design may be interesting to read and, if well illustrated, delightful to look at, but the housewife may question their value to her. However, these principles need not remain generalisations; they can be applied usefully to the study of home furnishings, cloths, or such everyday objects as pots and pans. Knowledge and understanding of the subject will become a source of increased satisfaction in recognising and using well-designed products and will act as a guide in choosing and buying them. This article by Norma K. Metson, Rural Sociologist, Department of Agriculture, Wellington, describes the materials used and the characteristics necessary for utensils used in food preparation and in cooking on the stove top or in the oven.



[*Sparrow Industrial Pictures Ltd. photo.*

Kitchen hardware, including a rack of stainless steel utensils and a stainless steel egg beater of good type.

IN the design of kitchen utensils materials and function are of primary importance. Tradition can be largely ignored, as most people wish their kitchens to be as up to date as possible. Beauty is not a basic aim, but is often a result. The commonest materials used for kitchen utensils are aluminium, enamel, oven glass, earthenware, tin, and iron. Each of these has qualities making it particularly suitable for some purpose; none by itself would be adequate for all the necessary equipment of a farm kitchen.

Characteristics of Materials

Aluminium is light, pleasant to handle, conducts heat quickly and evenly, and is unaffected by acids. Alkalis and abrasives such as are contained in harsh soaps and cleaning powders will damage it. Cast aluminium is used for heavy pans and kettles suitable for waterless cooking. The ordinary saucepan is stamped from a sheet of metal rolled to a certain thickness (gauge). The durability of the pot depends partly on the thickness of the metal and partly on the nature of the alloy, for pure aluminium is very soft and small quantities of other metals must be added to make it hard enough for use. The usual finish is a smooth polish, but there are two special processes—anodising, used for bowls and cake tins, leaving a silvery, mat surface, and buffing with a steel brush, which gives a dull finish and a product known as spun aluminium; this can be seen in some of the pressure saucepans now on the market.

Enamel is used for many utensils, particularly saucepans, bowls, piedishes, measures, mugs, and plates. Enamelware is made from a steel base which is dipped in liquid enamel, then dried and fired. Its quality depends on the number of treatments given; the cheapest types are dipped only once and may not be fired, and the best quality is given 3 coatings, the last being of specially hard, acid-resistant enamel. A limited number of colours can be used. Cheap enamel is to be avoided because the finish is likely to crack with changes in temperature and it stains and chips very readily, making it dangerous to use and allowing the steel base to rust. Too thin a pan conducts the heat unevenly, causing foods to burn.

"Tin" articles are made of a steel or iron base with a thin coating of tin to resist rust and corrosion. Careful drying after use helps to prevent rust. They are inexpensive and quite suitable for baking tins, for example, which do not receive very hard wear. An article in daily use—for instance, a tin kettle—will wear out fairly rapidly, but is cheap enough to be replaced easily. If very thin, "tin" will bend and dent easily; it is better to choose a sturdy type and to inspect seams and corners carefully for roughness and sharp edges. The patterned surface finish of some tin pans helps to prevent foods from sticking and the pan from warping in the heat of the oven.

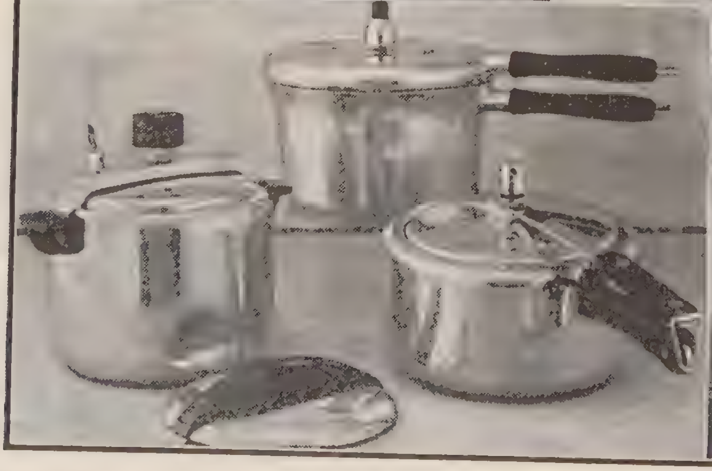
Iron, the material of the pioneers' camp ovens, kettles, and enormous black pots, is used now only for special purposes. Cast iron, being heavy, holds heat well and distributes it evenly, but is very brittle, so articles made from it, such as gem irons, are likely to break if dropped. Other items usually made from iron are

SAUCEPAN DESIGNS

Right—A group of enamelware, including a set of five saucepans and three triangular pots for use on one element of a stove.

Left—Enamel saucepans with iron bases specially made for electric stoves. The side handles conserve space on the stove.

Right — Aluminium saucepans with straight rimless sides, lids which fit closely, and handles firmly held by three rivets.



Left—Three types of pressure saucepan. They are essentially airtight containers with gauges for controlling steam pressure.

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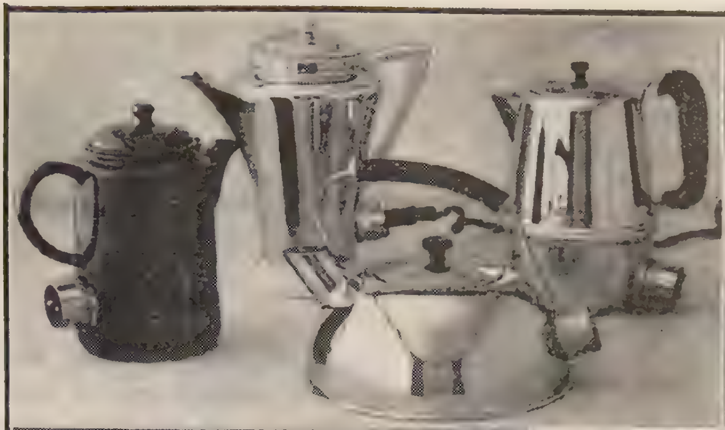
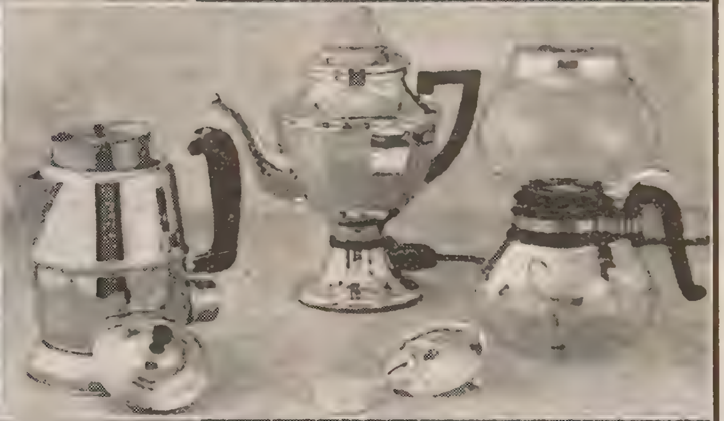
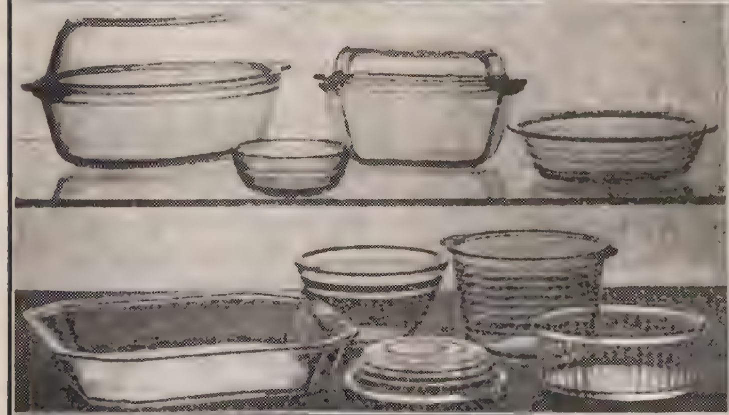
JUGS AND OVENWARE



Left—Three types of electric jugs and an electric kettle. They should be reasonably quiet in operation, and the design should incorporate a device to switch off the current if the jug boils dry.

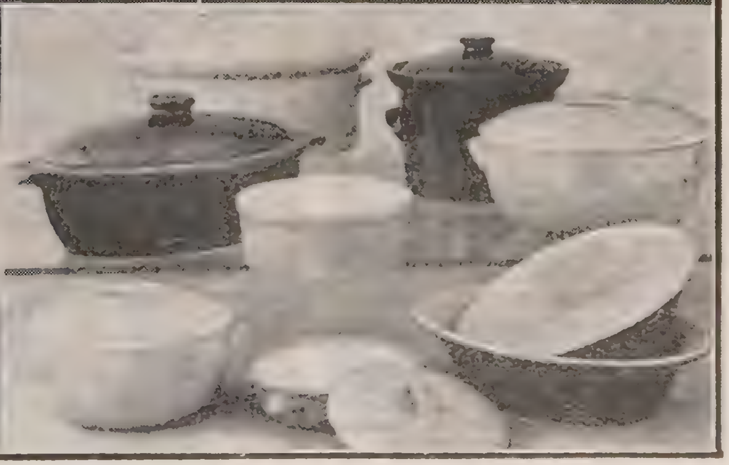
Right—Coffee makers, two with their own elements and one of glass which can withstand the heat of being used on the top of a stove. These attractive articles are now in plentiful supply.





Left—A group of oven glassware including casseroles, basins, souffle dish, and roasting dish. Of good appearance, utensils of this material can be used as both cooking and serving dishes.

Right—Ovenware in china and earthenware. A special heat-resistant type of earthenware is popular for casseroles because of its gay colours, attractive shapes, and heat-retaining properties.



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DESIGN OF KITCHEN UTENSILS . . .

girdles, oven trays, and frying pans. A frying pan may be of lightweight sheet iron or of a heavier and thicker type which takes longer to heat but gives more even cooking. Galvanised iron (iron coated with zinc as in corrugated roofing iron) cannot be used for cooking utensils, but is satisfactory for buckets, dippers, or scrap tins.

Earthenware is used for storage containers (the familiar buff-coloured crocks) and mixing bowls, and a special heat-resistant type has been evolved, popular for casseroles because of its gay colours, attractive shapes, and heat-retaining properties. Disadvantages are that it is breakable and sudden changes of temperature, especially if a dish hot from the oven comes into contact with cold water, may cause cracking or spoil the glaze.

Oven glass: An elegant appearance, suitability for oven cooking and serving dishes, and transparency are the outstanding characteristics of this material. Recently glass which can be used for top-of-stove cooking has been evolved, so at last it is possible to see what is going on inside a pot with the lid on. Care in use is necessary because, though toughened and treated, glass is still breakable and sensitive to sudden temperature changes.

Top-of-Stove Cooking

Saucepans: A good saucepan has a smooth, flat base, to obtain close contact with and full benefit from the source of heat; straight sides without rims, requiring less room on the stove than sloping ones; a rounded curve inside where sides and bottom join to make cleaning easy; and a closely-fitting lid to prevent the escape of steam. The handle may be attached with rivets—there should be 3 holding it firmly—or welded to the pan so that it has become part of it. Usually the handle is of hollow metal, but it may have a short metal shank with a wooden or plastic extension. Wood and plastic are cool to touch, but may break, chip, or char, thus spoiling a pan which otherwise is in good order. For a small family using an electric stove a set of 2 semi-circular or 3 wedge-shaped pans will save power, as several foods can be cooked at once on the same element; however, these pans are wasteful if used singly. Double boilers should have a wide, flat base, the upper section rounded, and no deep, hard-to-clean groove on the inside.

Kettles: A good spout and a handle shaped so that the kettle is well balanced and easy to hold make for satisfactory pouring, which is the chief duty of a kettle. Some attempts at streamlining have resulted in such poor design that the kettle has to be tilted to an impossible angle before it will pour. All kettles, except the cheapest, should have a lid; otherwise they are difficult to clean. Electric kettles and jugs should be reasonably silent in operation and incorporate a safety mechanism which shuts off the current if the kettle boils dry and becomes overheated. Chromium with a polished surface to prevent heat loss is the accepted material for electric kettles, earthenware or enamel for the jugs, and enamel or aluminium for kettles used directly on the stove.

Pressure saucepans are made of heavy, cast aluminium and are essentially airtight containers with a gauge for controlling steam pressure and allowing its release at a certain point. Almost all the brands available are good-looking and efficient. The most prominent difference in design is that some types have a lid which goes over the top of the saucepan and locks on the outside, and in others the lid slips inside the pan and is held under an overlapping rim. The former have a slightly-larger capacity, the latter a neater appearance.

Coffee makers: Perfectly-good coffee can be made very simply in a saucepan on the stove, but people who are particular about the exact flavour of their brew, or who can afford slight extravangances, may wish to acquire one of the attractive glass or chromium coffee makers which are plentiful at present. These are constructed so that they can be used on a stove or plugged in to make the coffee and then transferred to the table for serving it when the upper bowl or inset containing the coffee grounds has been removed.

Oven Cooking Utensils

Few joins and smooth surfaces, sturdy material to withstand high oven temperatures, and appropriate sizes and shapes for the purpose required are the essentials for ovenware. Many a good soufflé or cake mixture has been ruined through being baked in a pan that was too shallow or not large enough. If possible, utensils should be chosen to fit economically into the oven space—for example, 2 piedishes which can be placed side by side on a shelf without touching each other or the sides of the oven, and casseroles with recessed handles in the lids instead of projecting knobs which add considerably to the height.

High-sided pans prevent biscuits from browning on top; tin ones are too thin and will allow them to burn on the bottom. The most satisfactory results are obtained from a smooth iron tray with an oxidised finish to prevent rust and a low, turned edge on 2 or 4 sides. Sets of patty tins should have a flat surface, no rims round the cups, a smooth finish, and as few joints as possible. A cast iron container will produce browner, crustier cooking than tin or aluminium.

Roasting pans may be of iron, enamel, or tin, and should have a rack. Handles or a flat rim should be provided for easy grasping.

Utensils for Preparing Food

Knives: Blunt knives are time-wasting and annoying to a busy housewife. Good kitchen knives should be chosen carefully for quality and to feel comfortable in use; kept sharp by frequent "touching up" with steel or oilstone and storing in a rack which protects the edge; and used for their proper purpose, not for opening tins or sharpening pencils. Stainless blades are preferable for table knives and will retain quite a good edge. The sharpest and finest cutting knife is of high-carbon steel with a forged blade which can be recognised by its tapering from handle to point and from back to front. The best handles for kitchen knives are of polished wood with the metal of the blade continuing the full length of the handle and held in place by two or more rivets. A small, fine knife for peeling, a large, narrow, flexible one for carving, and a broad rigid one for chopping will be adequate for most needs. Spatulas, which have blunt, very flexible blades, are most useful for removing biscuits from trays, turning pikelets, serving pies, etc.; they are obtainable with blades of various shapes and sizes.

Cooking spoons and forks: Wooden spoons should be smoothly finished and flattened at the tip of the bowl for effective contact with the base of the saucepan or bowl. Metal forks and spoons are easier to use if they have wooden handles.

Beaters: Rotary egg beaters save much time and effort. The best type has ball bearings in the driving gears and 8 thin, sharp blades which turn smoothly and beat mixtures to good volume and texture with little work. Blades flattened at the bottom are more effective for beating small quantities. A beater should be tried well before it is selected to make sure that both handles are comfortable to hold; a thin, metal handle, for example, will cut into the hand badly, and too small a handle on the driving wheel is difficult to grasp and tiring to use. Wire whisks produce a greater volume when egg whites are beaten, but require much more effort.

Graters should be rust resistant and of sturdy construction to prevent their bending and cracking. The holes in each set should be regular in size and smoothly finished. The closed circular or triangular type is more durable than the hinged folding variety, but for some purposes is less convenient to use.

Tin openers: The tin opener which operates by the turning of a butterfly screw and leaves a smooth, flat edge is safer and preferable to the common knife-blade type. More expensive but easier to use is an opener which can be attached to the wall and is ready for use at any time.

Numerous other small articles, such as rubber scrapers, cake coolers, strainers, biscuit cutters, metal skewers, and juice extractors, are needed by the housewife. Choice is very limited, but with most of them there is some opportunity of selecting a well-designed article in preference to one which is perhaps cheaper but will prove less durable and efficient.

FLOWER GARDEN ILLUSTRATIONS

On page 523 of the flower garden notes in last month's "Journal" two photographs of flowers were reproduced, but they were transposed. The upper illustration was of *Bomarea multiflora* and the lower of *Cantua buxifolia.*

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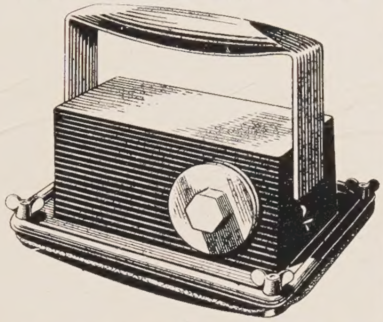

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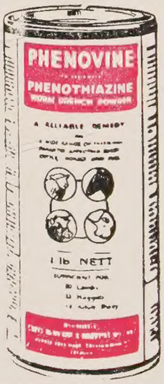

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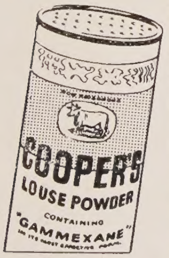

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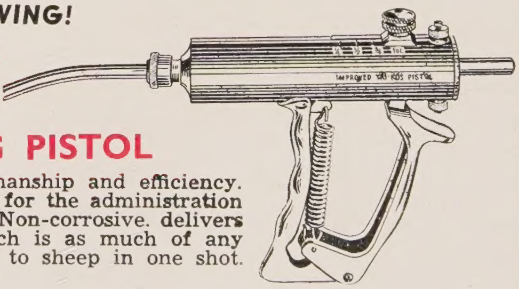

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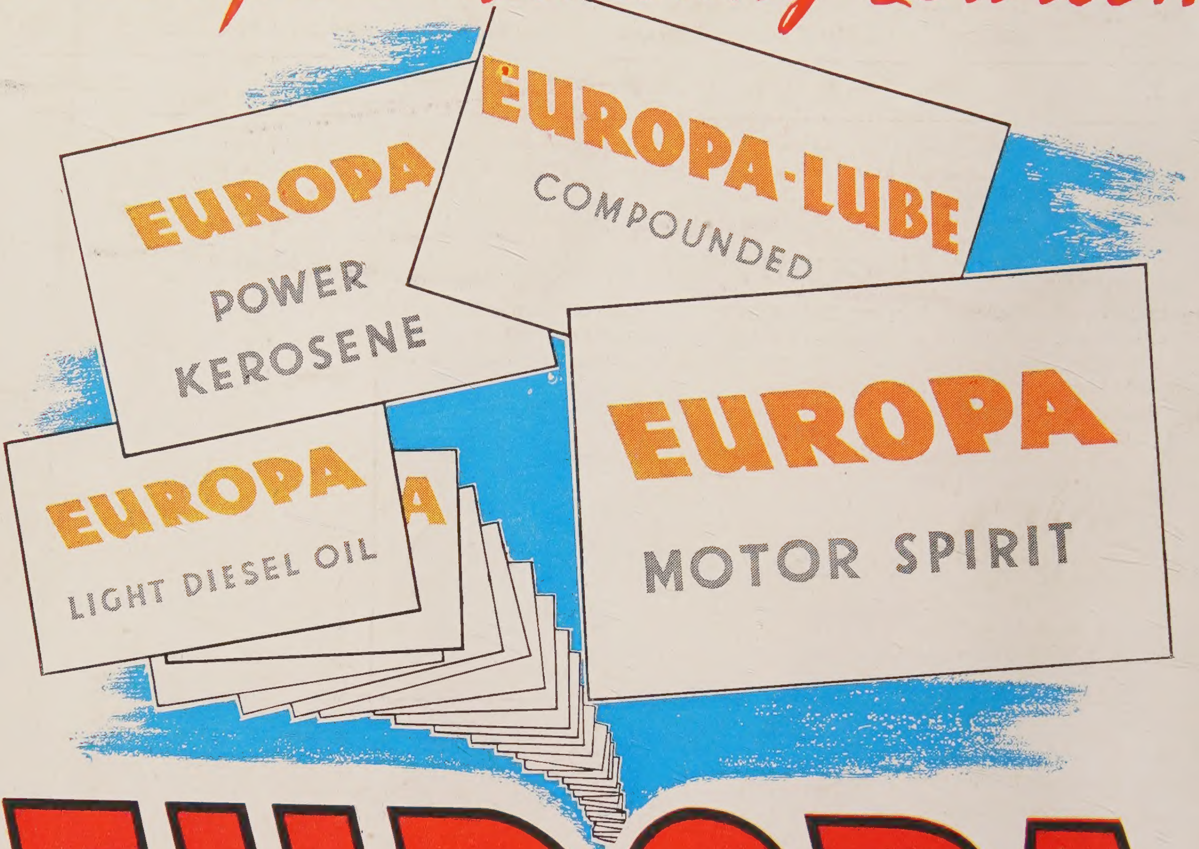
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